

# **TECHNICAL MEMORANDUM NO. 136**

## **V/S-IVB CONFIGURATION SKETCHES**

**SERIAL NO. A3-250-KBDB-69-TM-136**

**MODEL: V/S-IVB**

**EWO: 28220**

**SO: 5760-1006**

**JULY, 1969**

**PREPARED BY:  
PROJECT SUPPORT GROUP  
SATURN STRUCTURAL/MECHANICAL**



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ASSISTANT CHIEF  
SATURN IVB AND OPERATIONS BRANCH  
STRUCTURAL/MECHANICAL  
HUNTINGTON BEACH DEVELOPMENT ENGINEERING  
SATURN/APOLLO & APOLLO APPLICATIONS PROGRAMS**

**MCDONNELL DOUGLAS ASTRONAUTICS COMPANY**

5301 Bolsa Avenue, Huntington Beach, California 92647 (714) 897-0311



## PREFACE

This document consists of detailed sketches of the basic subsystems, components, and assemblies that comprise the Saturn V configuration of the S-IVB stage. Also included are certain items of ground support equipment. The purpose of the sketches is to serve as an informal, comprehensive reference source, and as such is intended for engineering reference only.

With regard to the part numbers identified herein, only the basic 7-digit Douglas part numbers are given for the most part. Because dash numbers are subject to change, they have been omitted as much as possible to preclude the necessity of making numerous revisions to the document.

This document is organized in six sections: Structures, Hydraulics, Ordnance, Environmental Control, Electrical, and Stage Support Equipment. In addition, there are two appendices, one containing structures specifications and the other containing stage diagrams.



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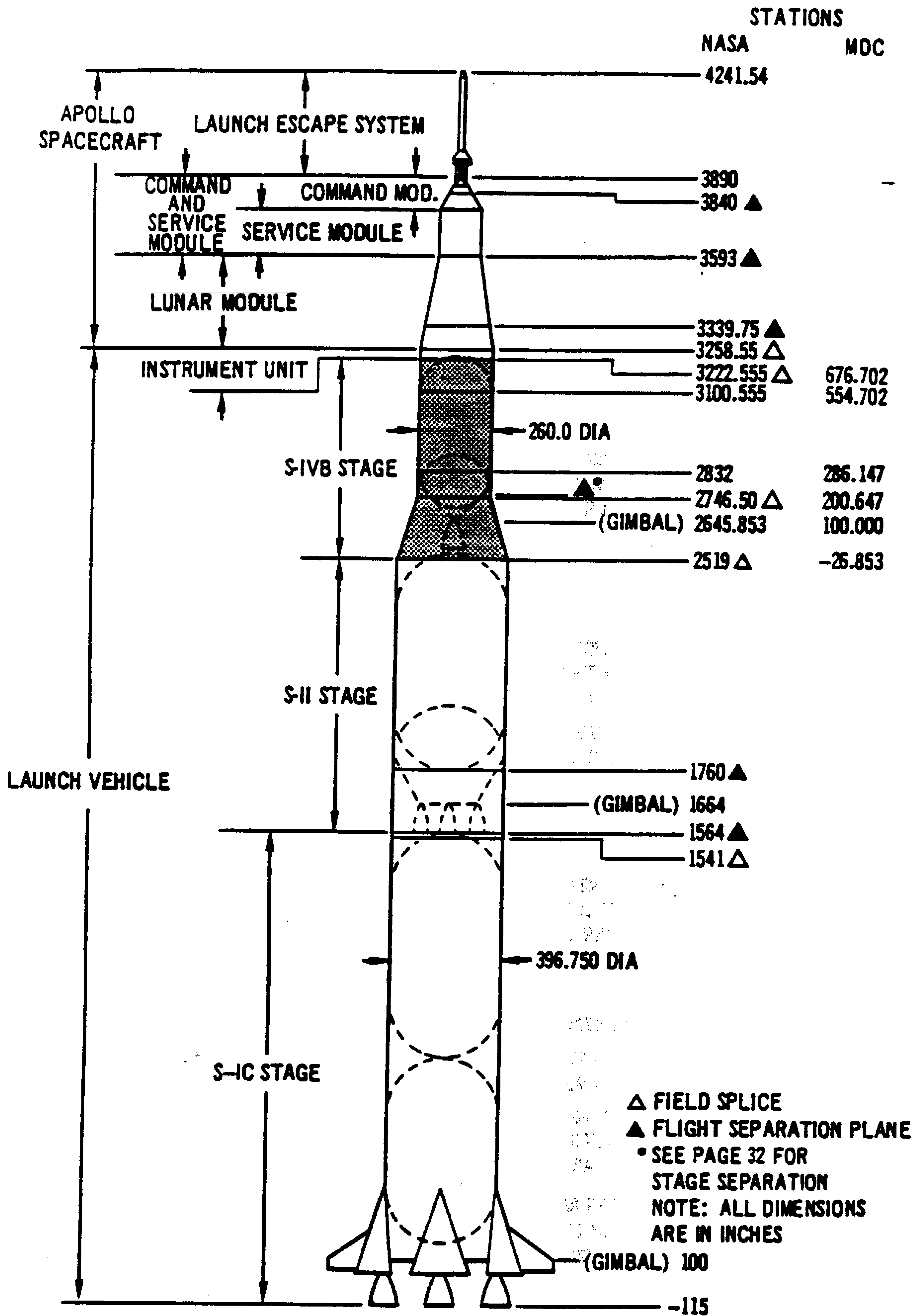
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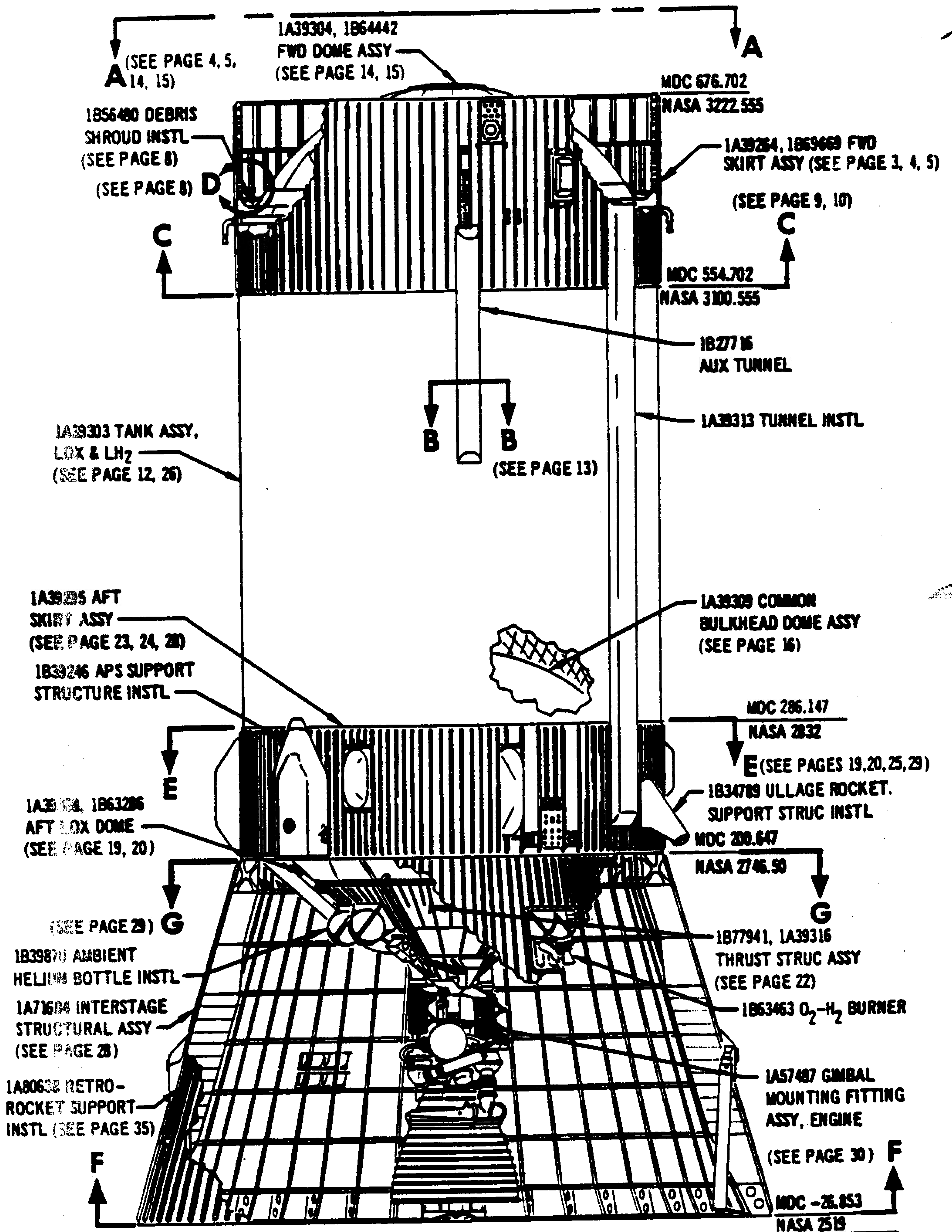
**SECTION 1**  
**STRUCTURES**





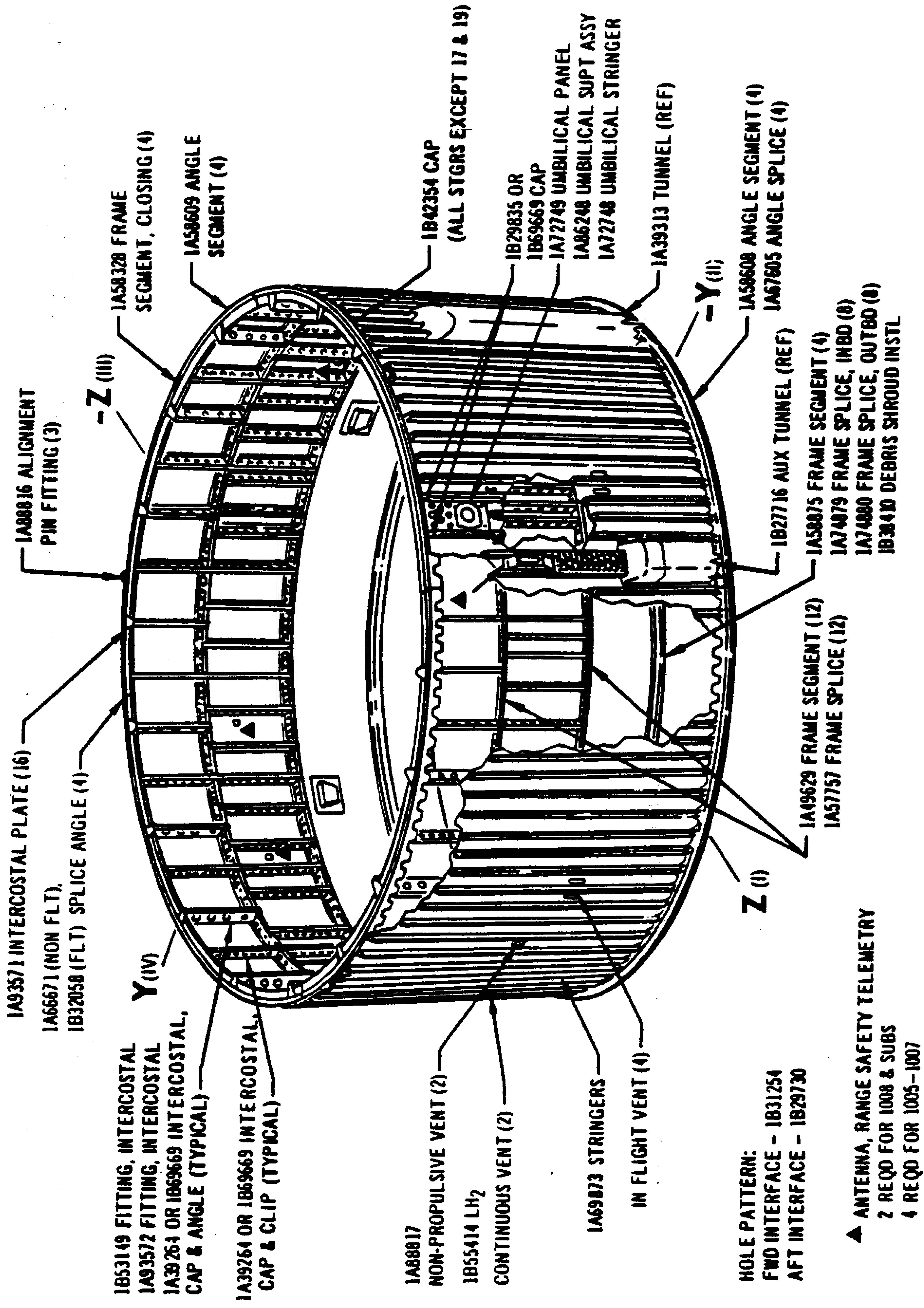
**SATURN V VEHICLE CONFIGURATION**





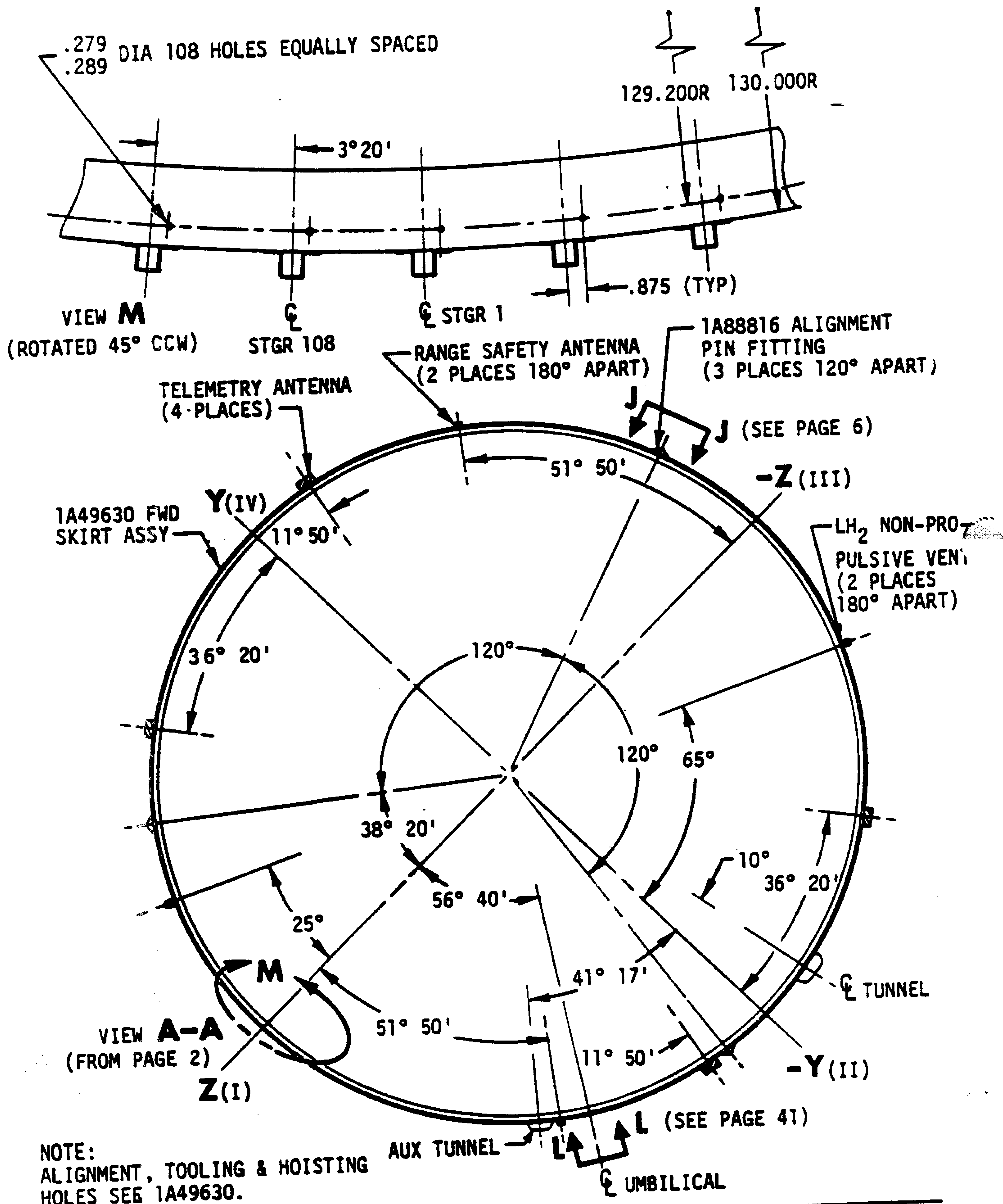
SATURN S-IVB/V FLIGHT STAGE (1B74500)





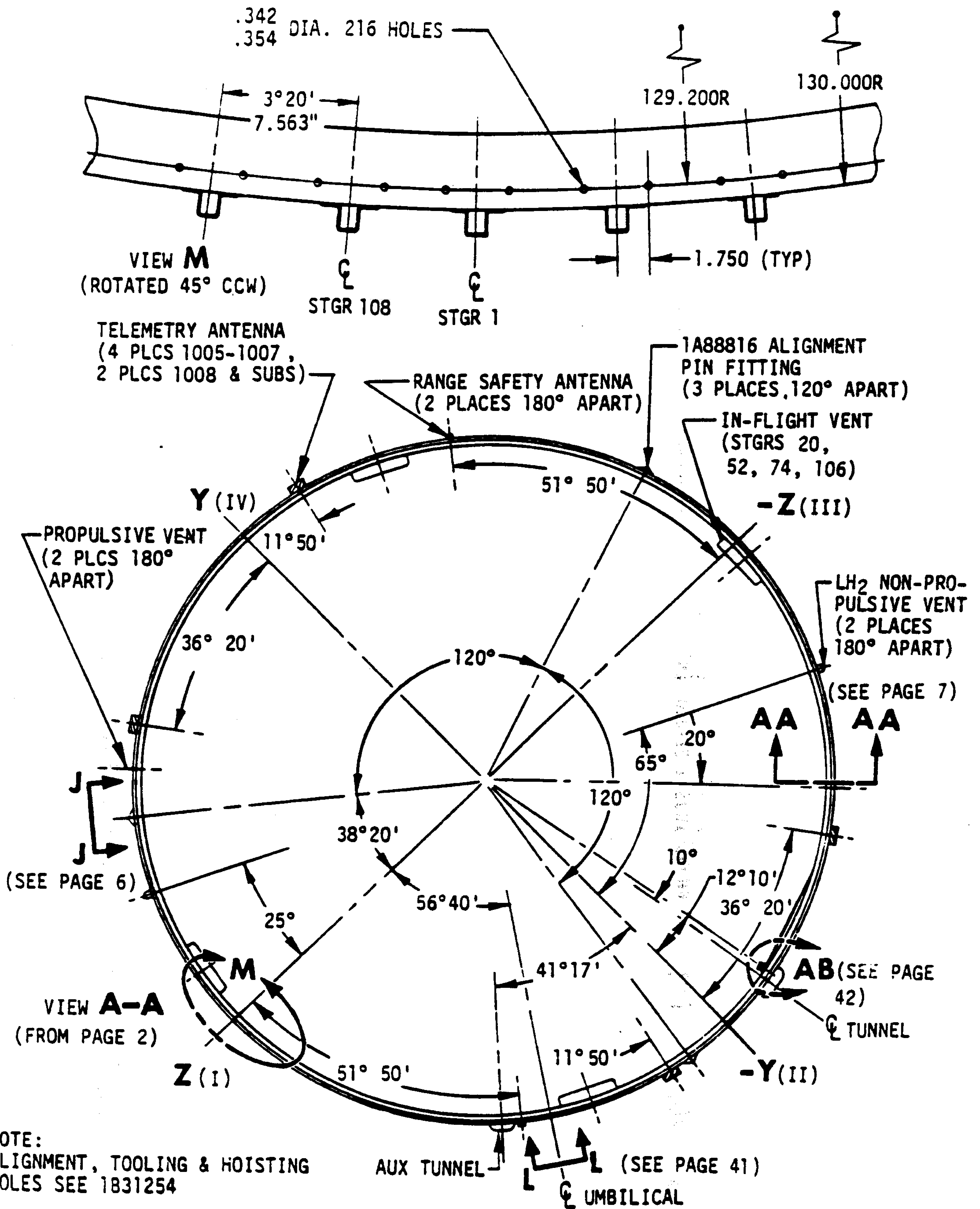
FORWARD SKIRT ASSEMBLY (1A39264-1005-509, 1B69669-510 & SUBS)



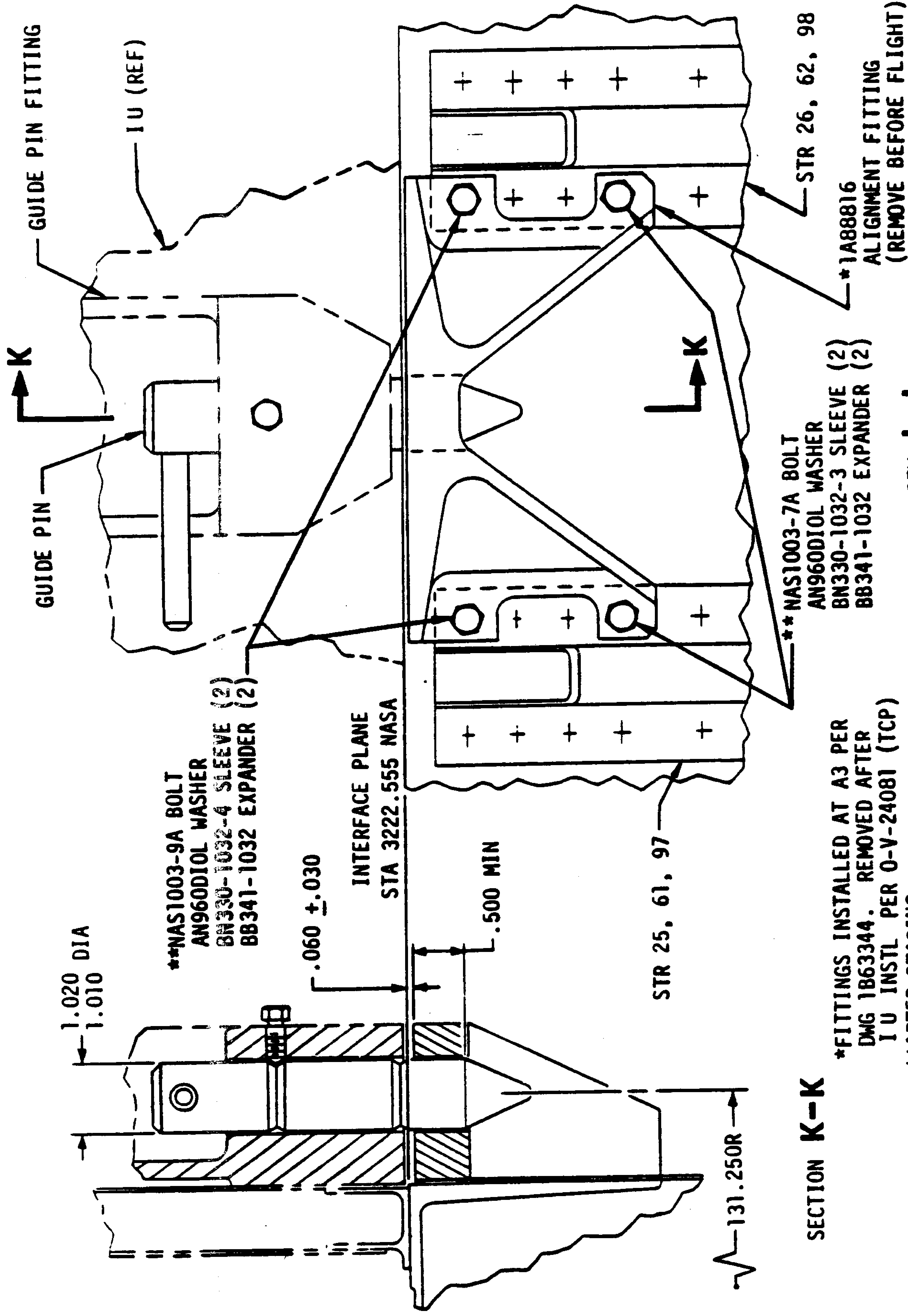


FORWARD SKIRT, FORWARD ANGLE (NON-FLIGHT STAGES)







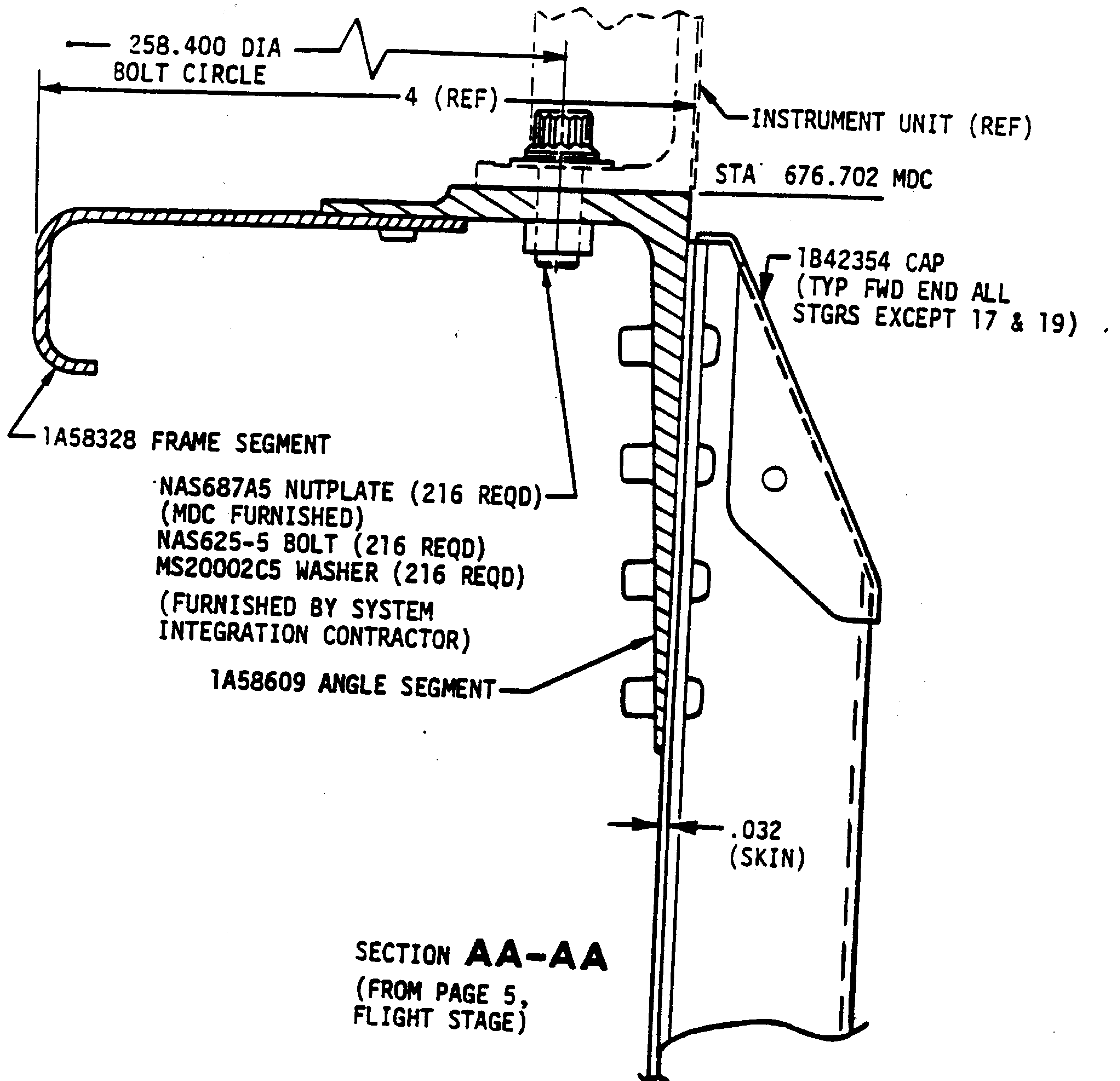


\*FITTINGS INSTALLED AT A3 PER  
DWG 1B63344. REMOVED AFTER  
IU INSTL PER O-V-24081 (TCP)

\*\*AFTER STAGING:  
NAS1003-5A REPLACES NAS1003-9A  
NAS1003-3A REPLACES NAS1003-7A

FITTING, ALIGNMENT PIN (1A88816) - FORWARD SKIRT TO IU



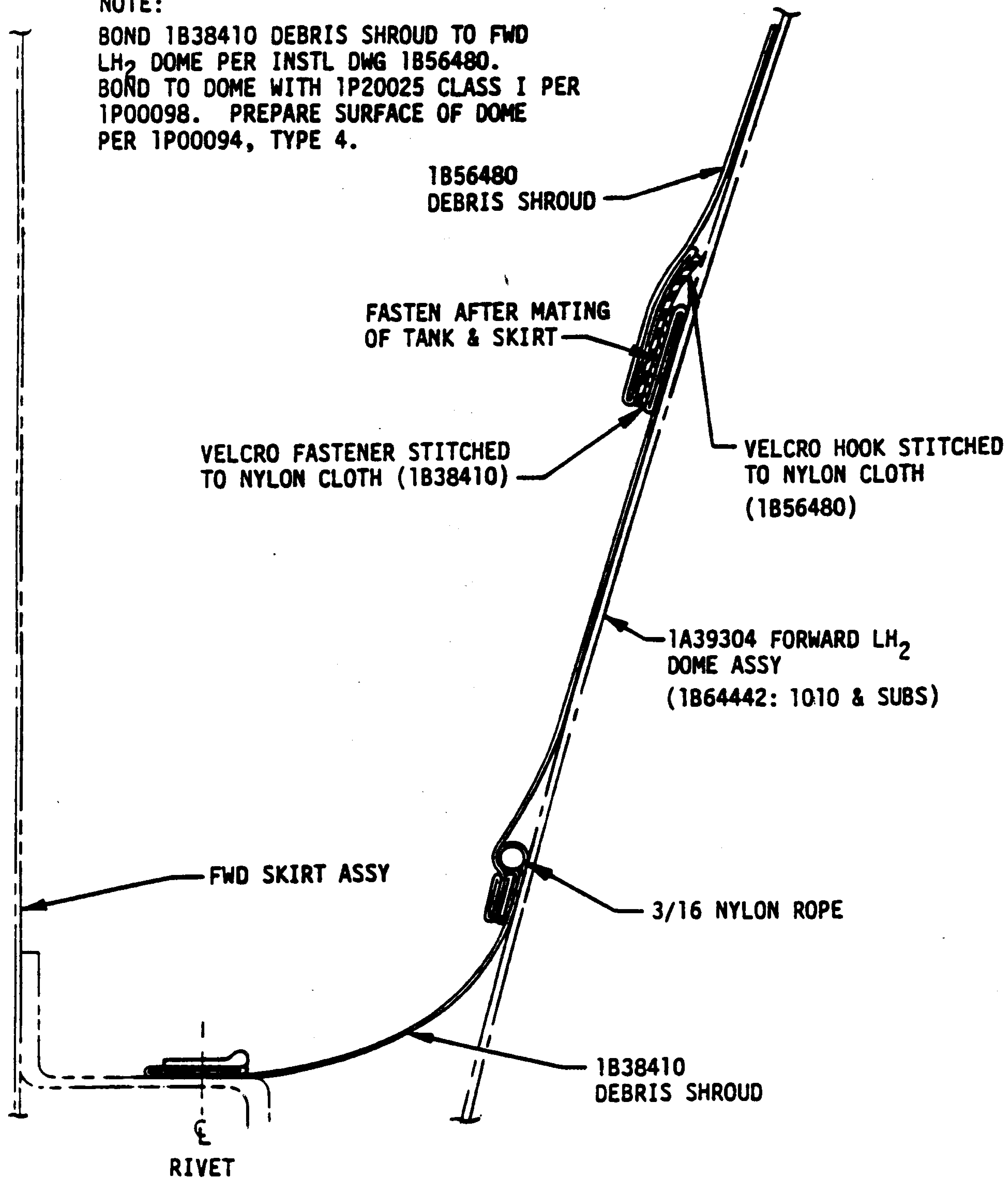


FORWARD SKIRT, FORWARD ANGLE



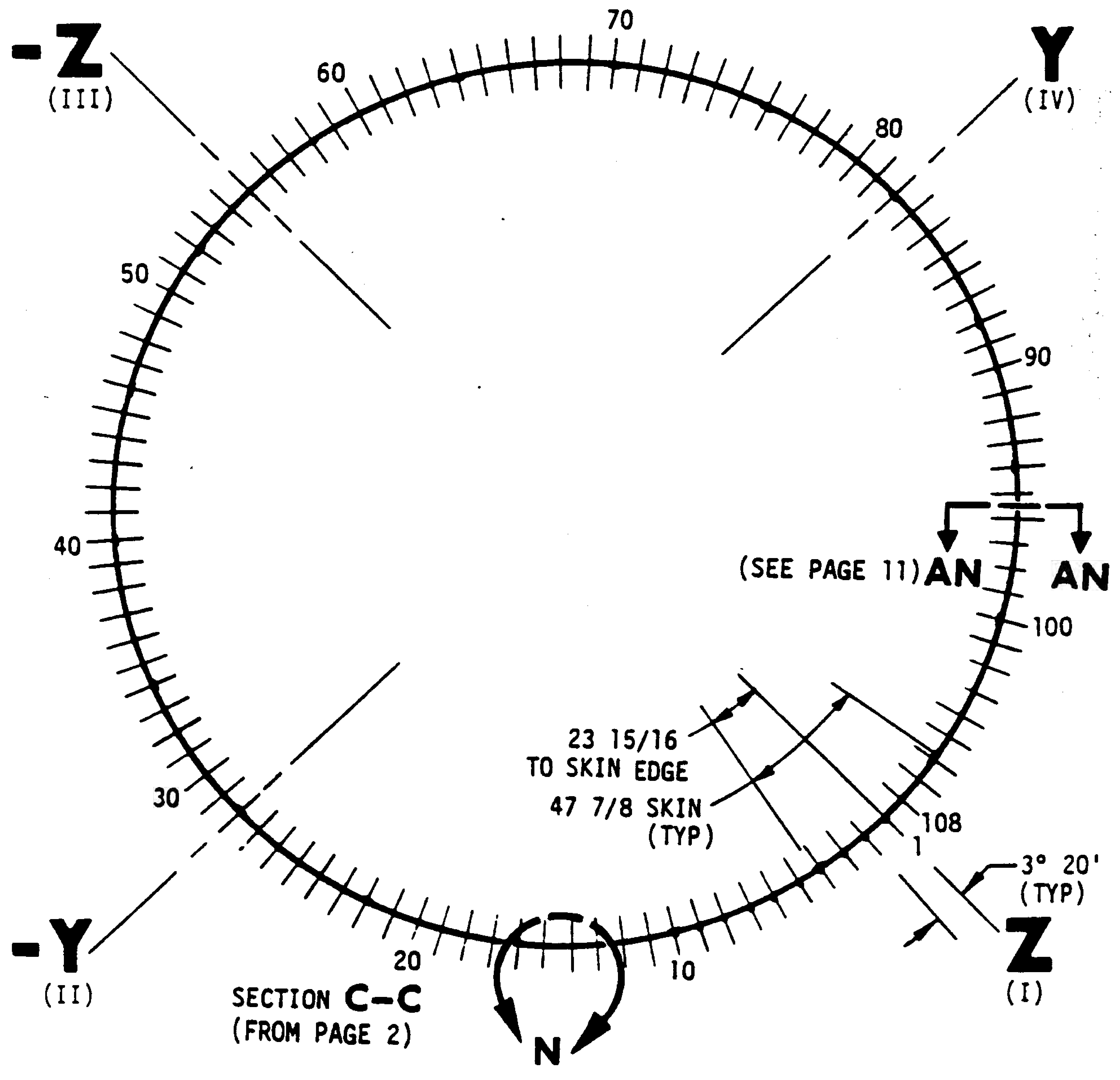
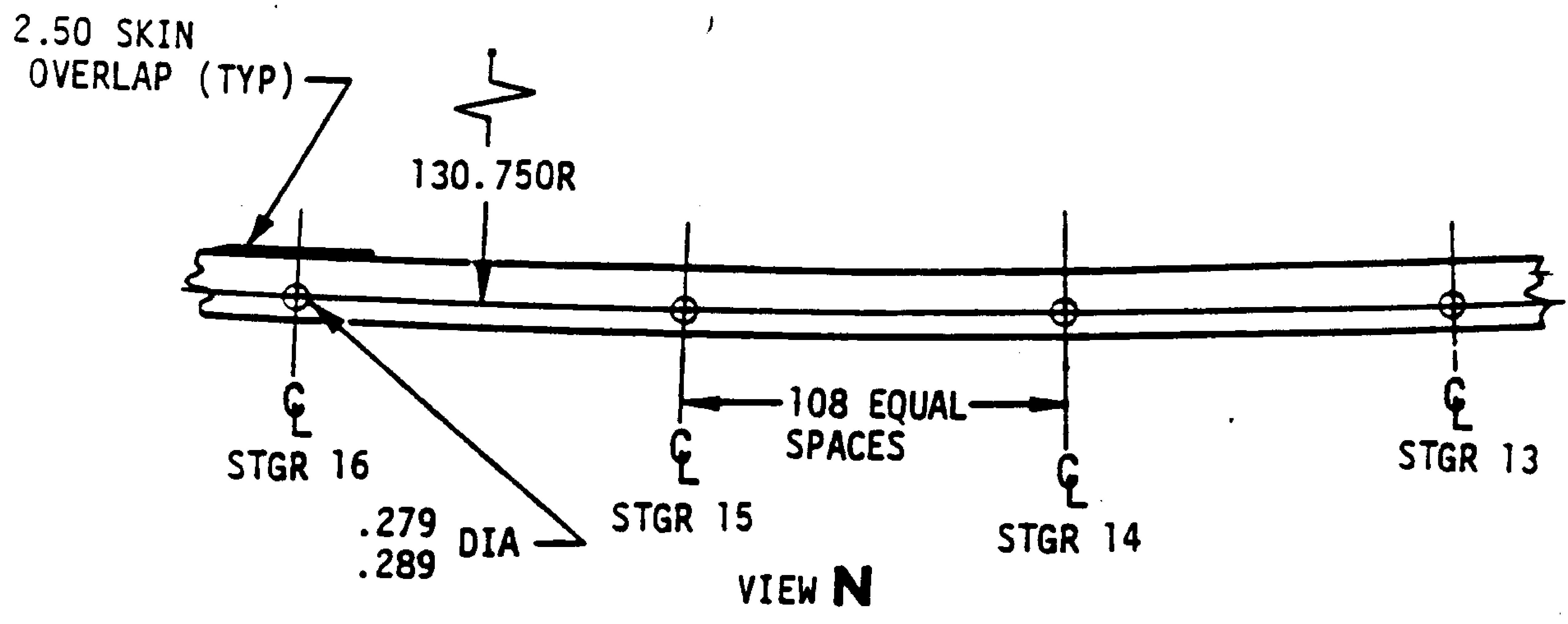
**NOTE:**

BOND 1B38410 DEBRIS SHROUD TO FWD  
LH<sub>2</sub> DOME PER INSTL DWG 1B56480.  
BOND TO DOME WITH 1P20025 CLASS I PER  
1P00098. PREPARE SURFACE OF DOME  
PER 1P00094, TYPE 4.



**VIEW D**  
(FROM PAGE 2)

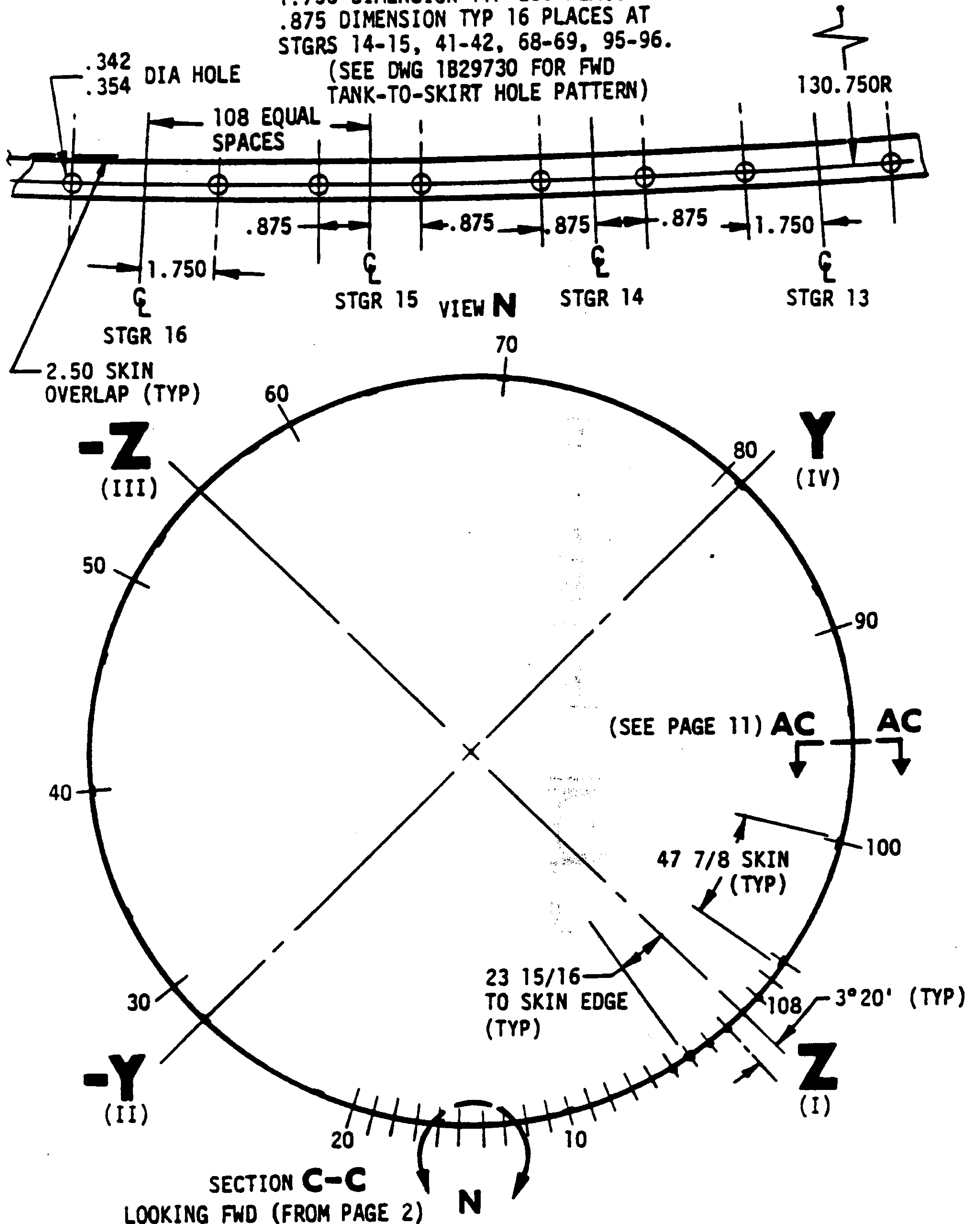




TANK TO FORWARD SKIRT (FACILITY CHECKOUT STAGE 1004)

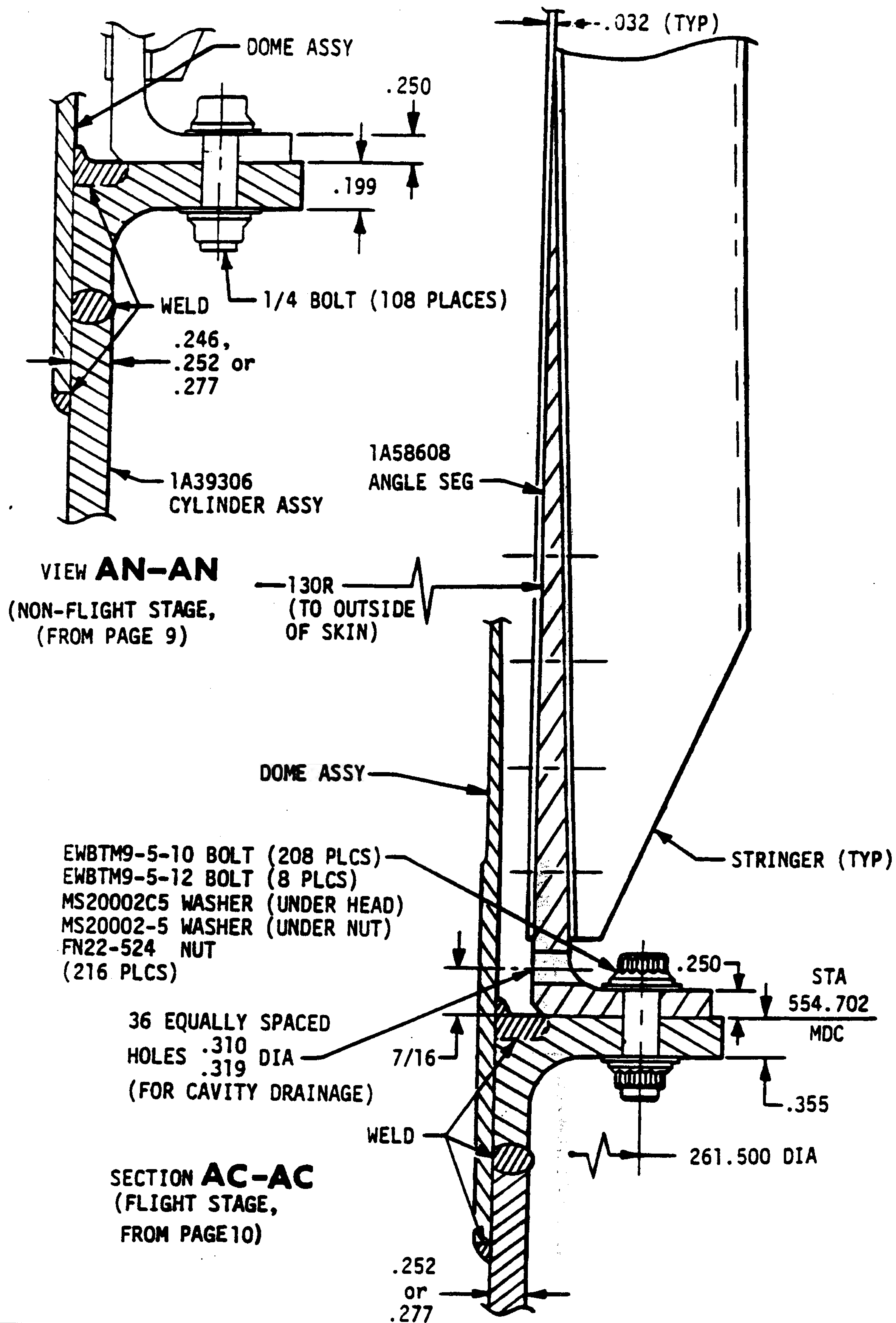


NOTE:  
 1.750 DIMENSION TYP 200 PLACES.  
 .875 DIMENSION TYP 16 PLACES AT  
 STGRS 14-15, 41-42, 68-69, 95-96.  
 (SEE DWG 1829730 FOR FWD  
 TANK-TO-SKIRT HOLE PATTERN)



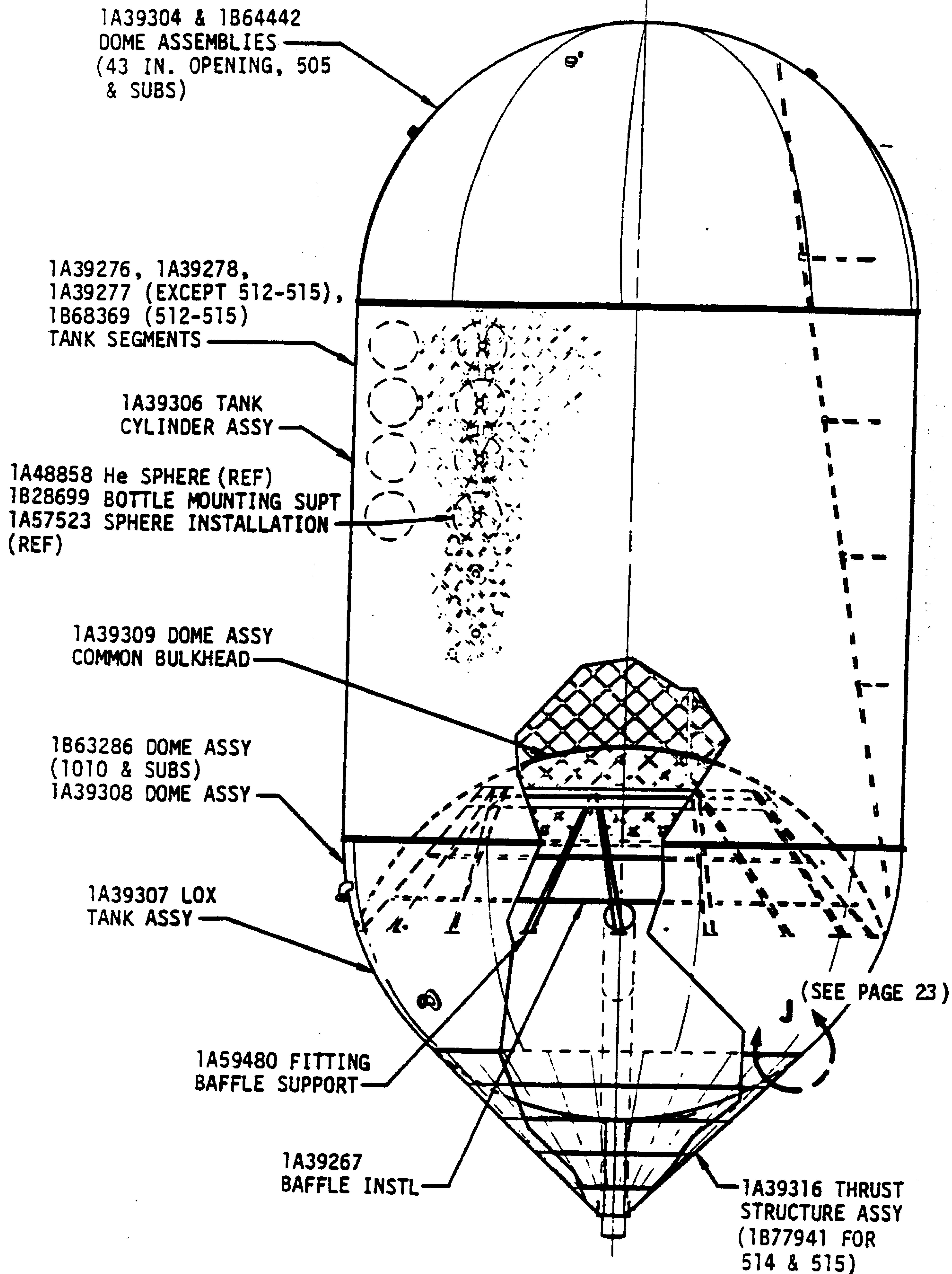
TANK TO FORWARD SKIRT (ALL FLIGHT STAGES)





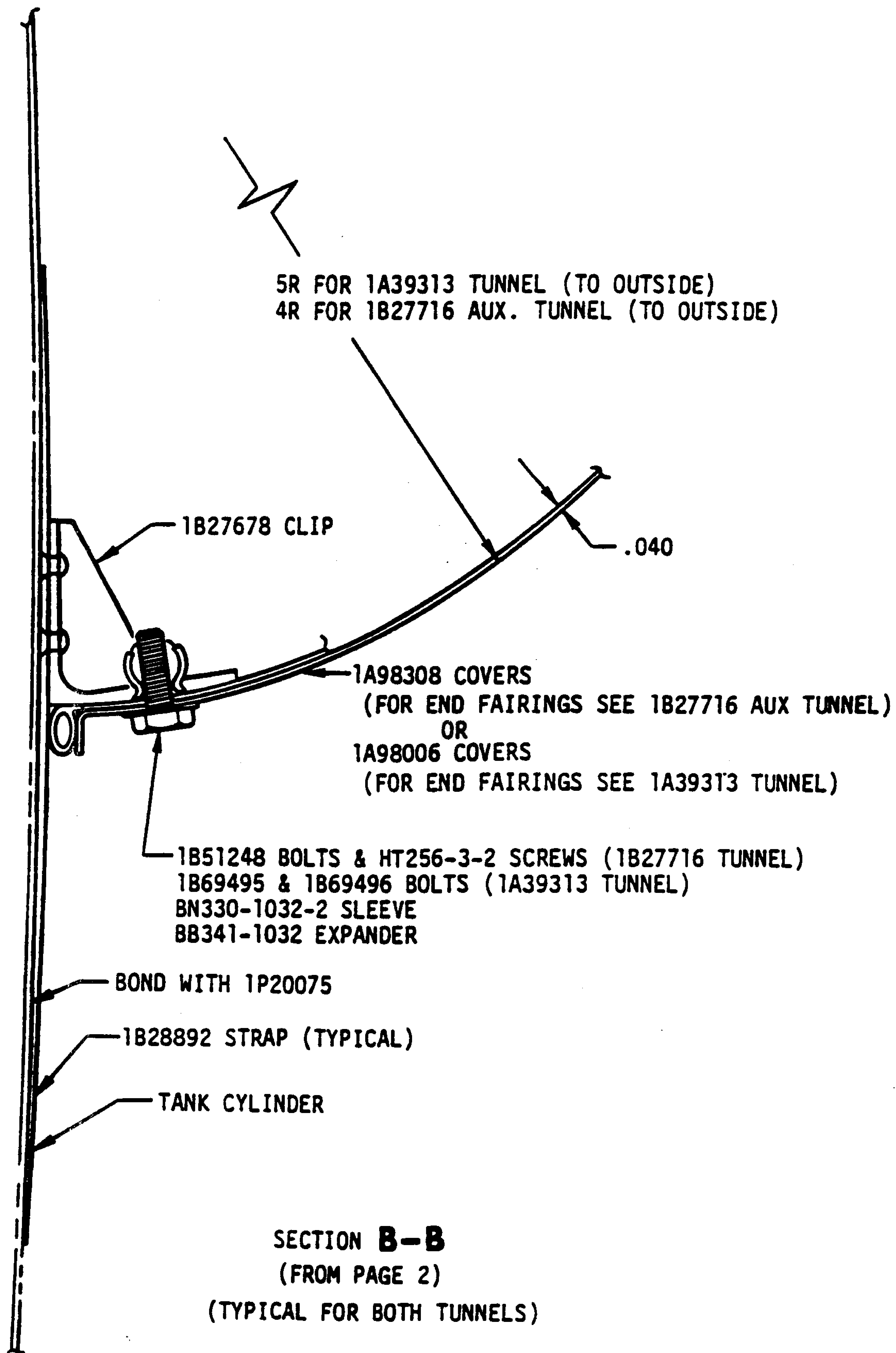
TANK TO FORWARD SKIRT - JOINT DETAILS





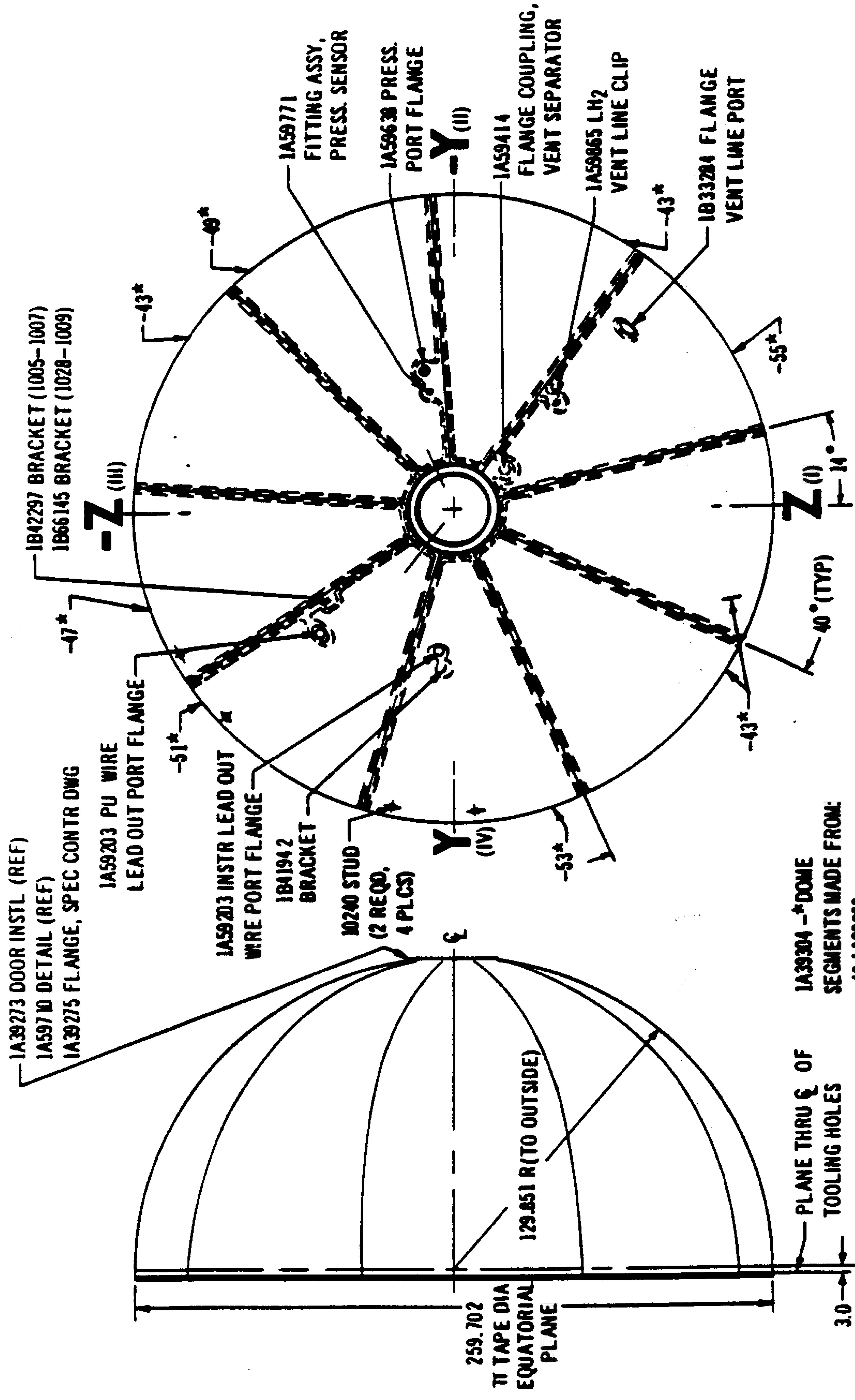
TANK ASSEMBLY (1A39303)





TUNNEL INSTALLATIONS (1A39313, 1B27716)



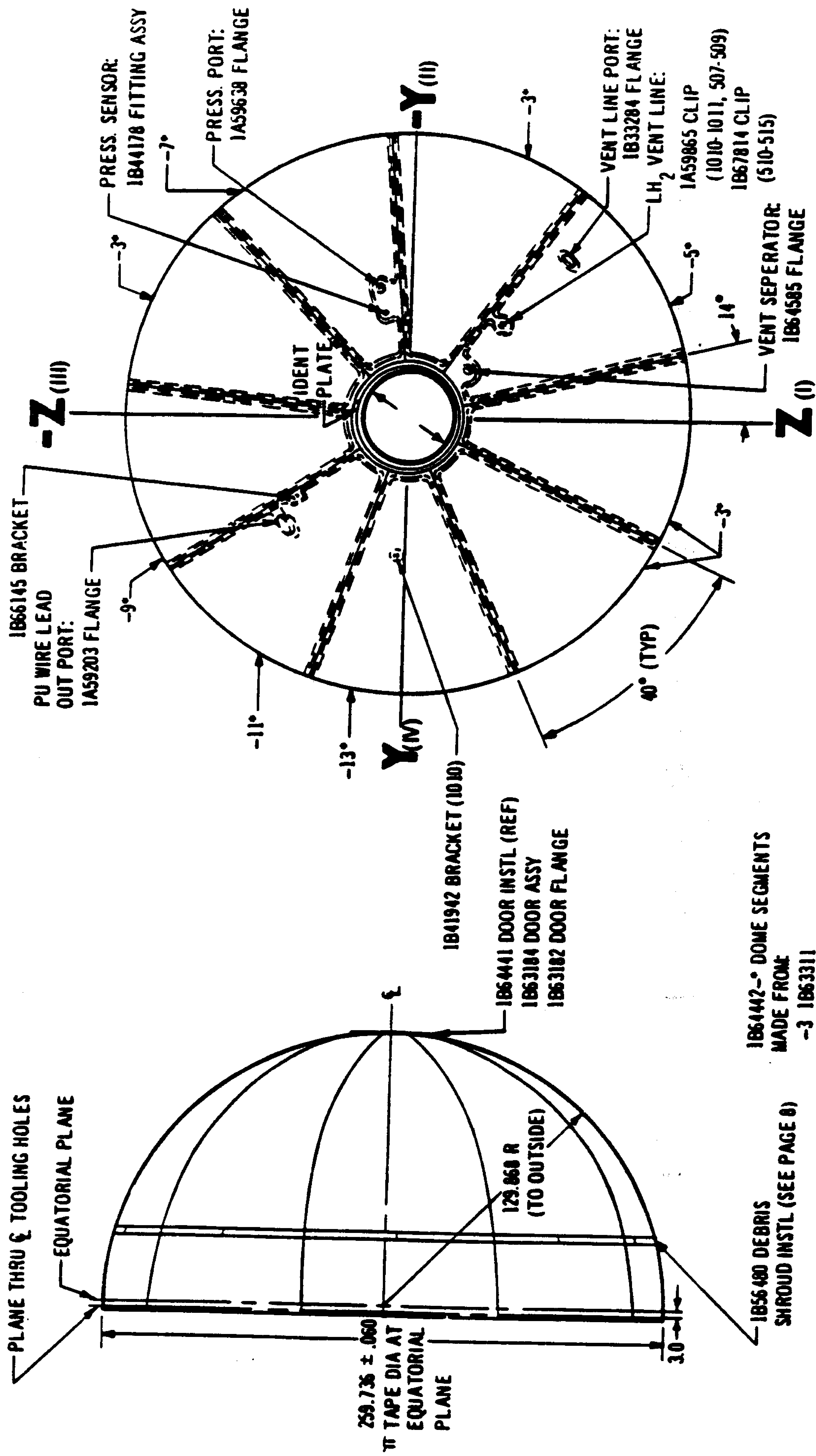


- 1A39304 - \*DOME  
 SEGMENTS MADE FROM:  
 -43 1A39268  
 -47 1A39270  
 -49 1A39271  
 -51 1A58761  
 -53 1A58762  
 -55 1A39269

VIEW **A-A** LOOKING AFT  
 (FROM PAGE 2)

NOTE:  
 FOR SPECIFIC LOCATIONS  
 OF ITEMS SEE 1A39304.





1B64442-° DOME SEGMENTS  
MADE FROM:

- 3 1B63311
- 5 1B63312
- 7 1B63316
- 9 1B63314
- 11 1B63315
- 13 1B63313

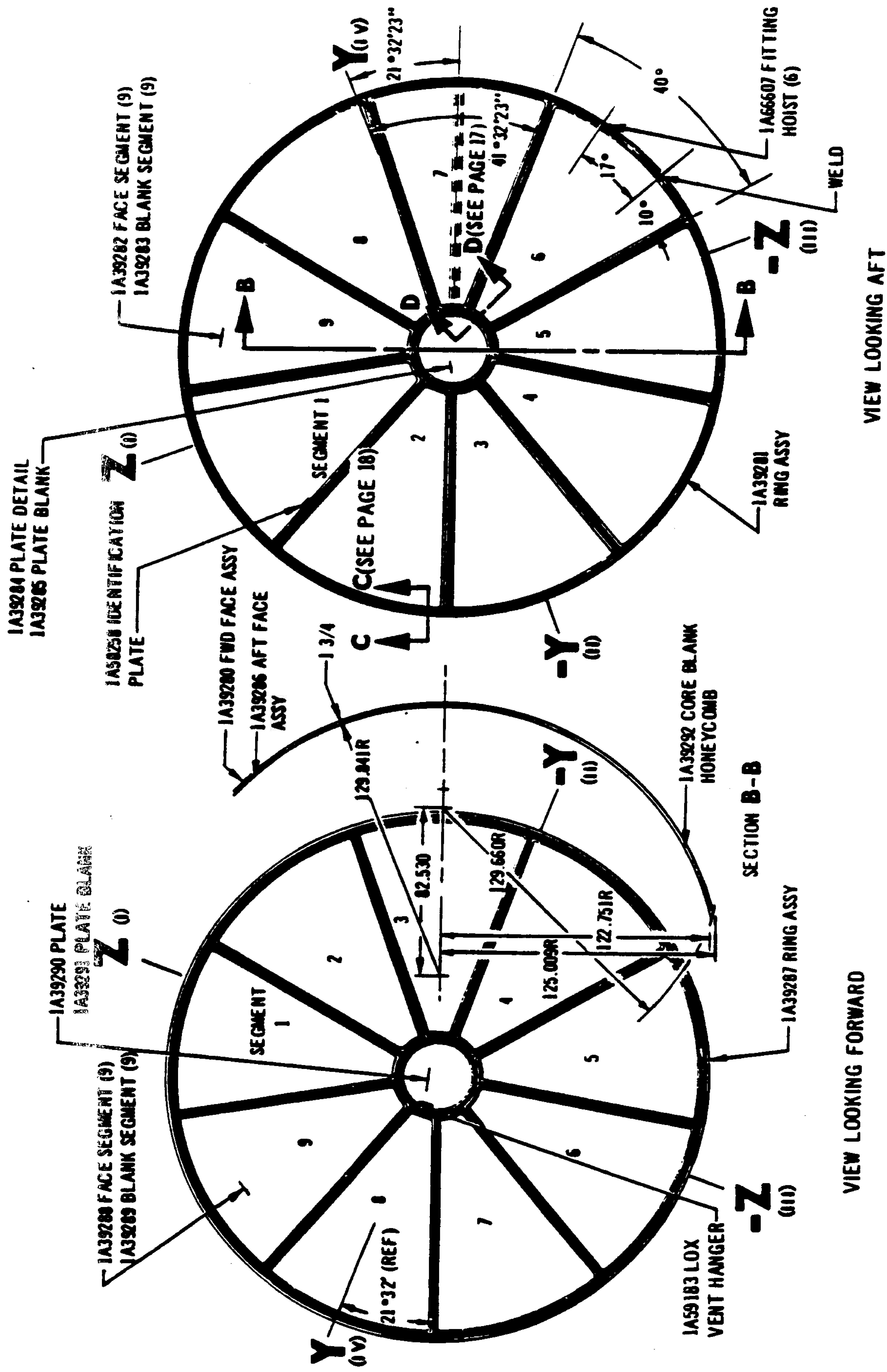
NOTE:

FOR SPECIFIC LOCATIONS OF  
ITEMS SEE 1B64442

A-A LOOKING AFT  
(FROM PAGE 2)

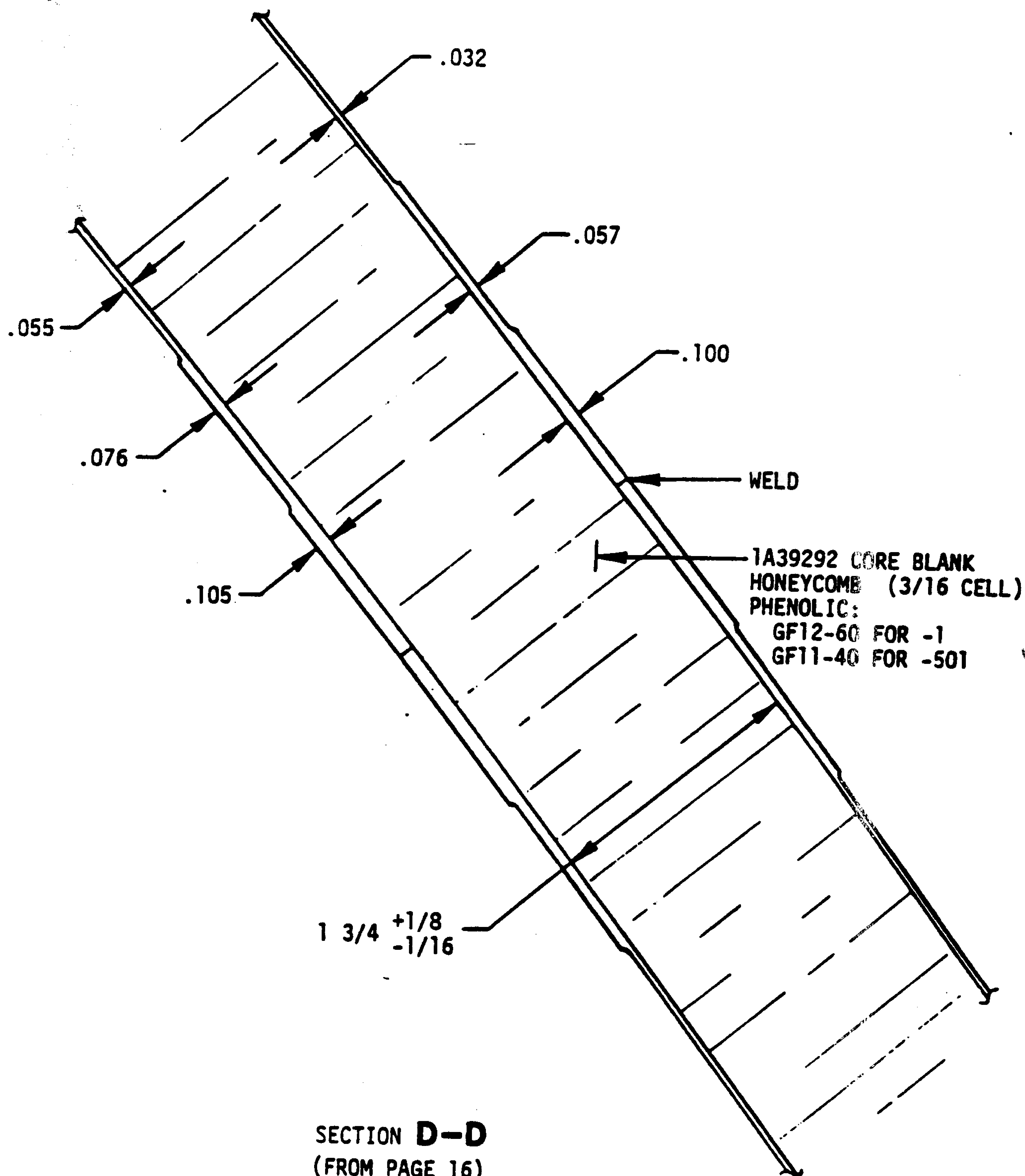
LH<sub>2</sub> DOME ASSEMBLY, FORWARD (1B64442 - 1010 & SUPP)





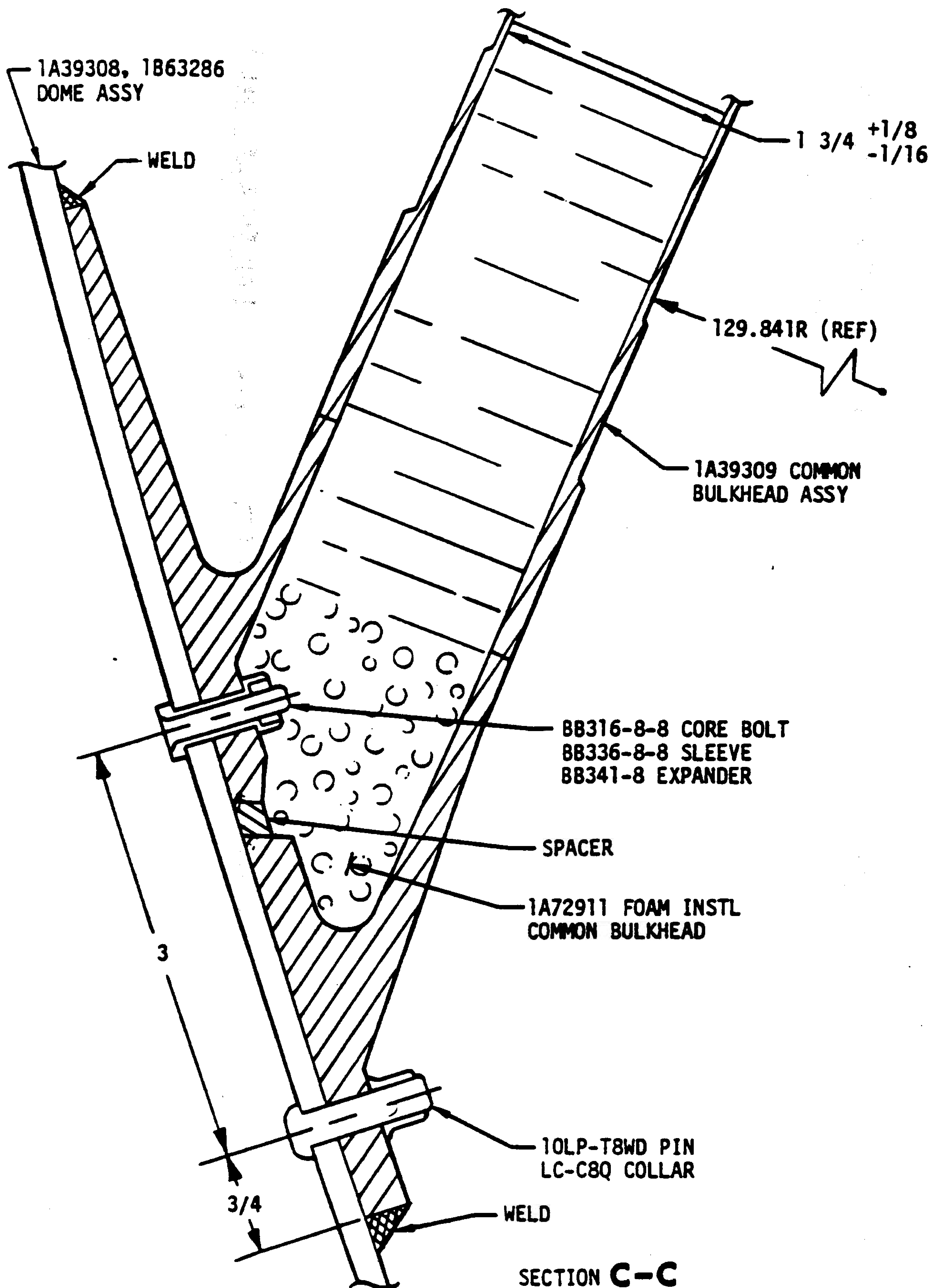
DOMES ASSEMBLY, COMMON BULKHEAD (1A39309)





COMMON BULKHEAD - CROSS SECTION OF HONEYCOMB





COMMON BULKHEAD - CROSS SECTION OF FOAM INSTALLATION

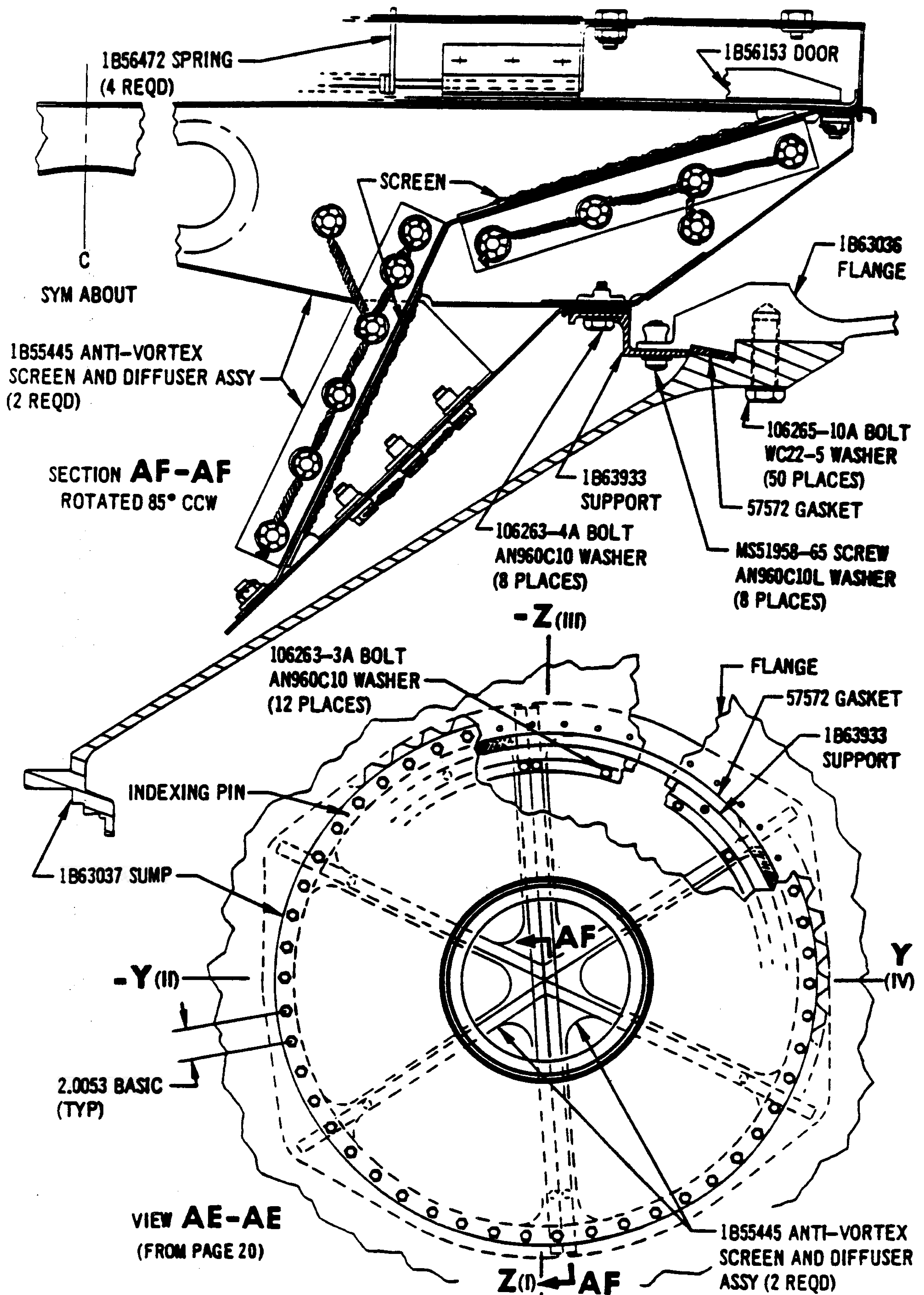






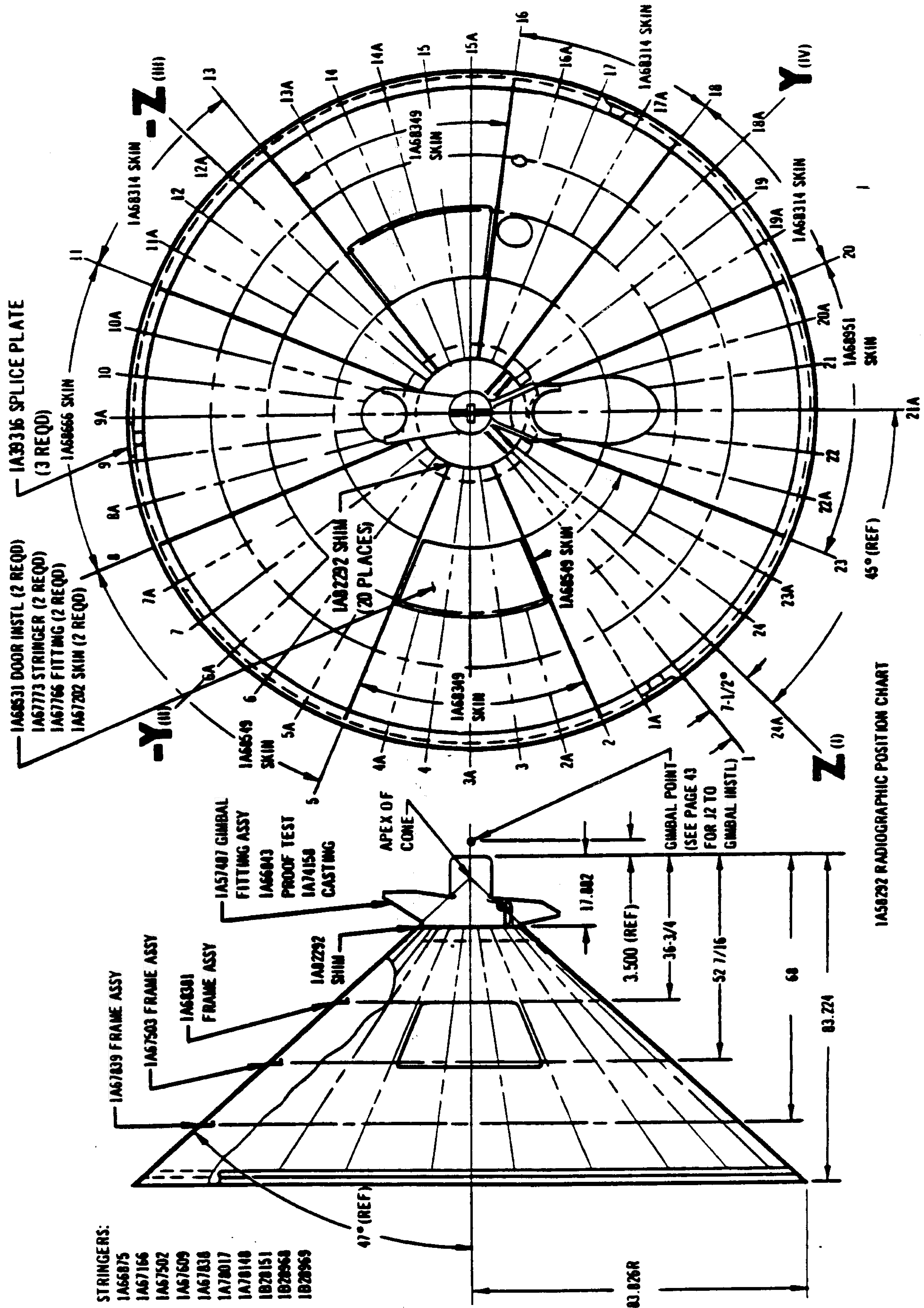




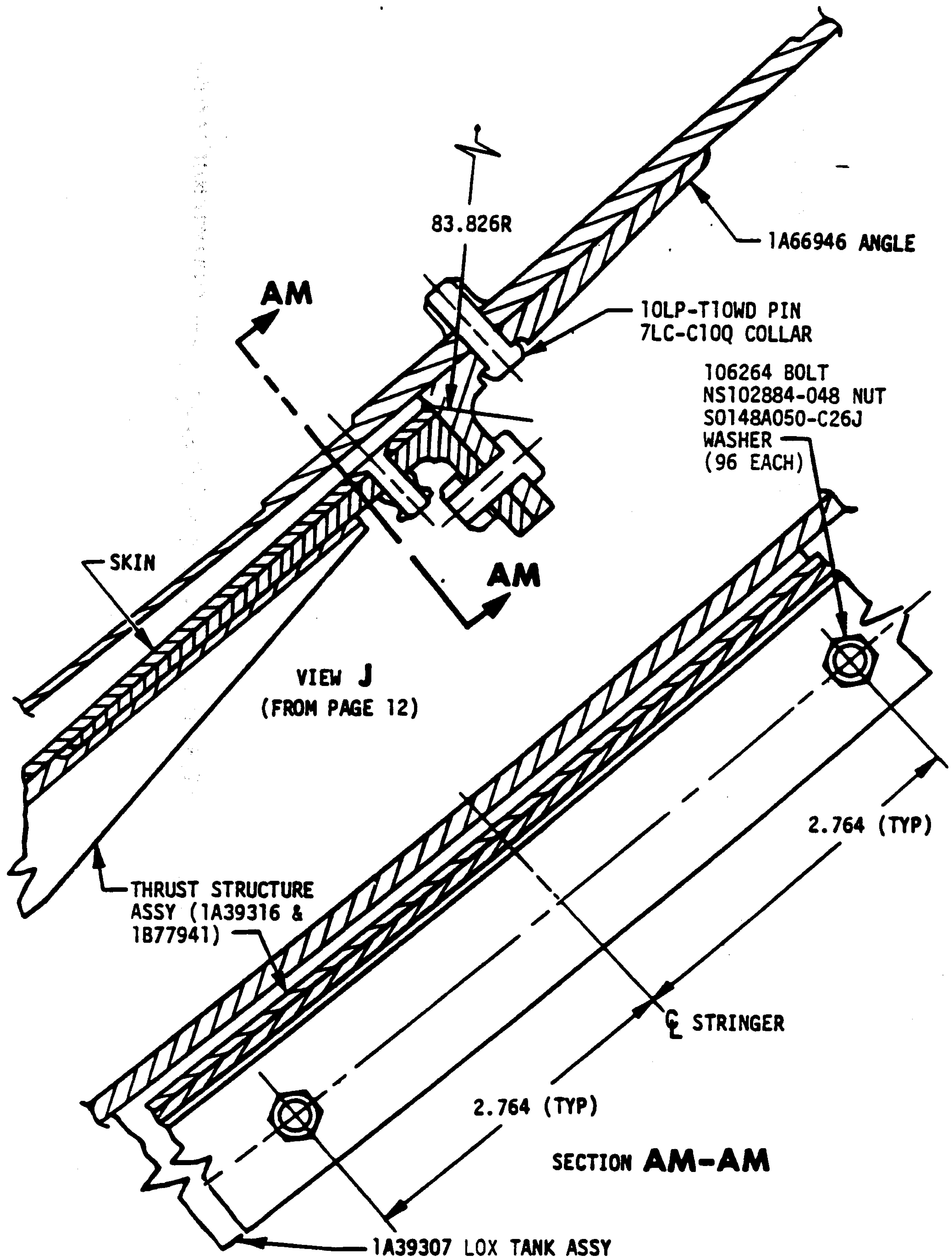


SUMP, LOX TANK (1A39154-1010-1011,507 & SUBS)



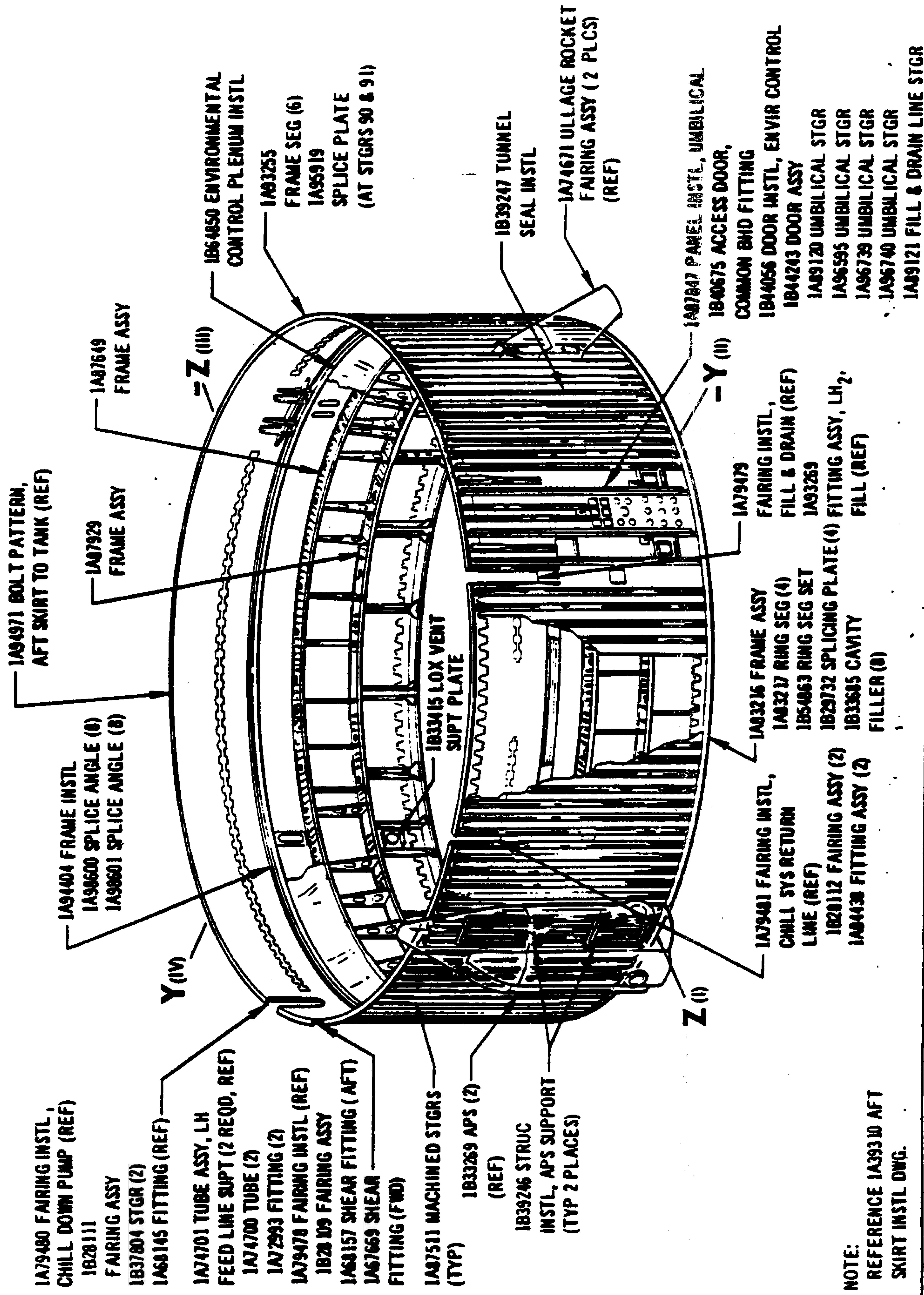






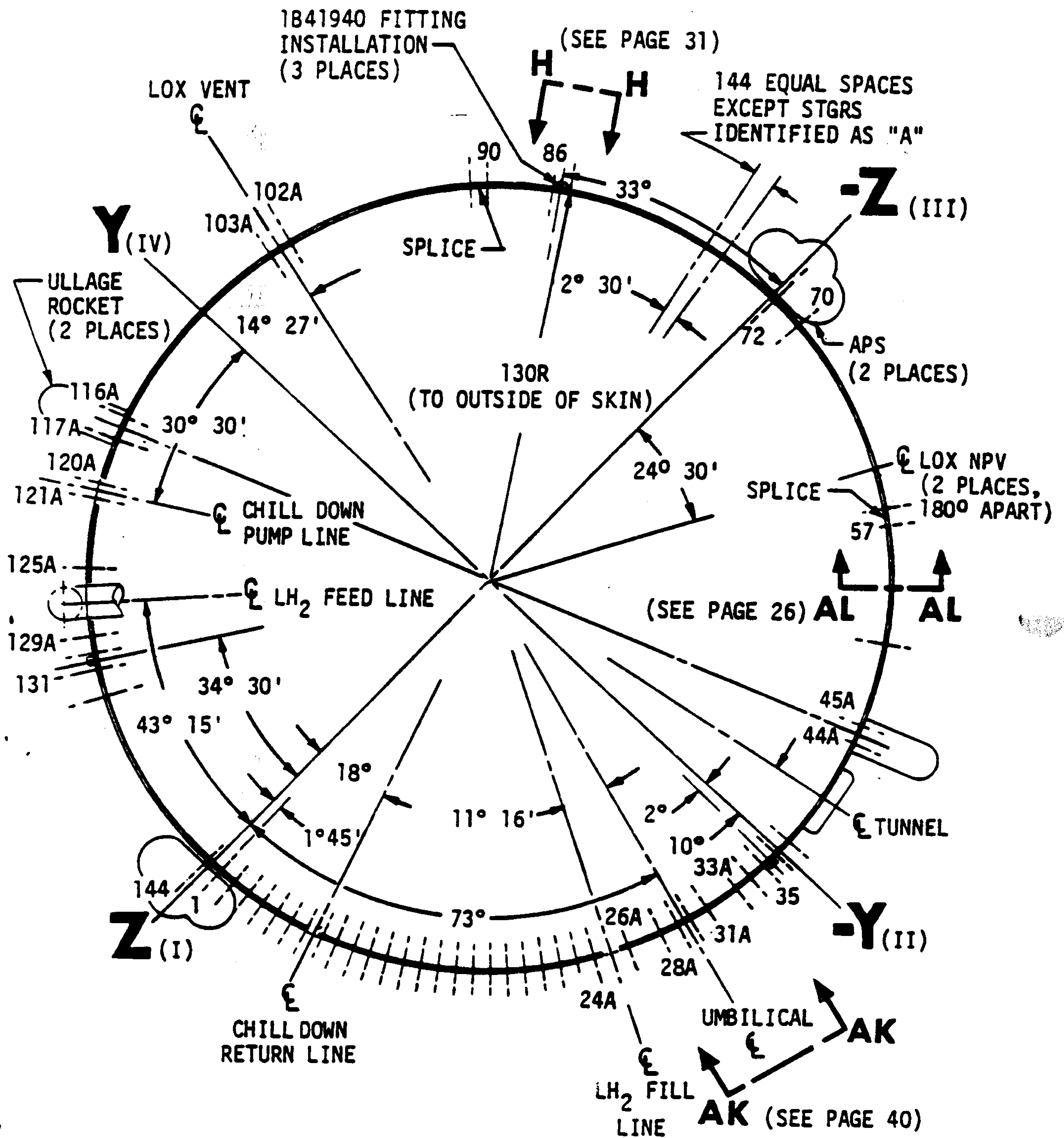
JOINT - THRUST STRUCTURE TO AFT DOME





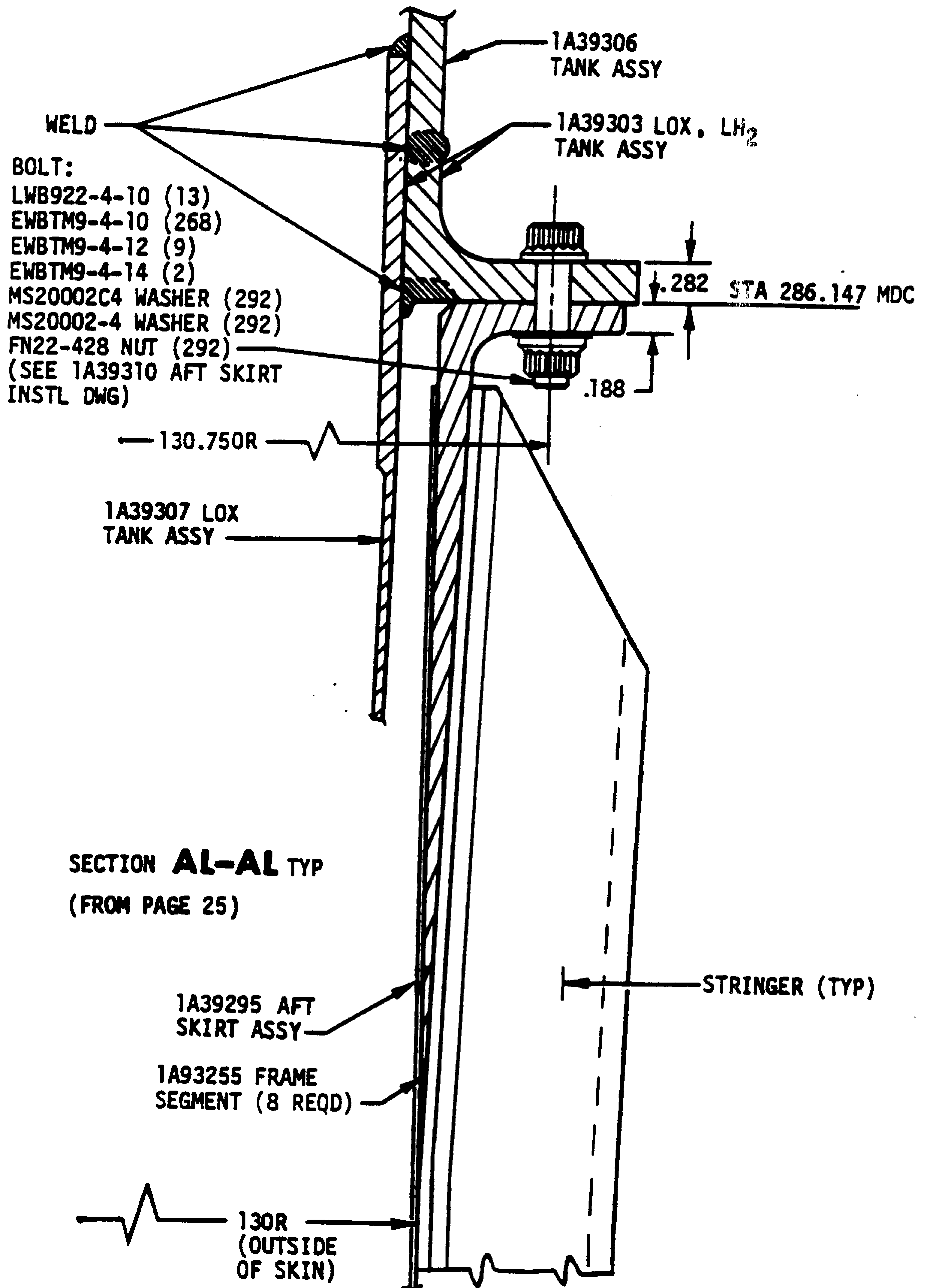
AFT SKIRT ASSEMBLY (1A39295 - 507 & SUBS)





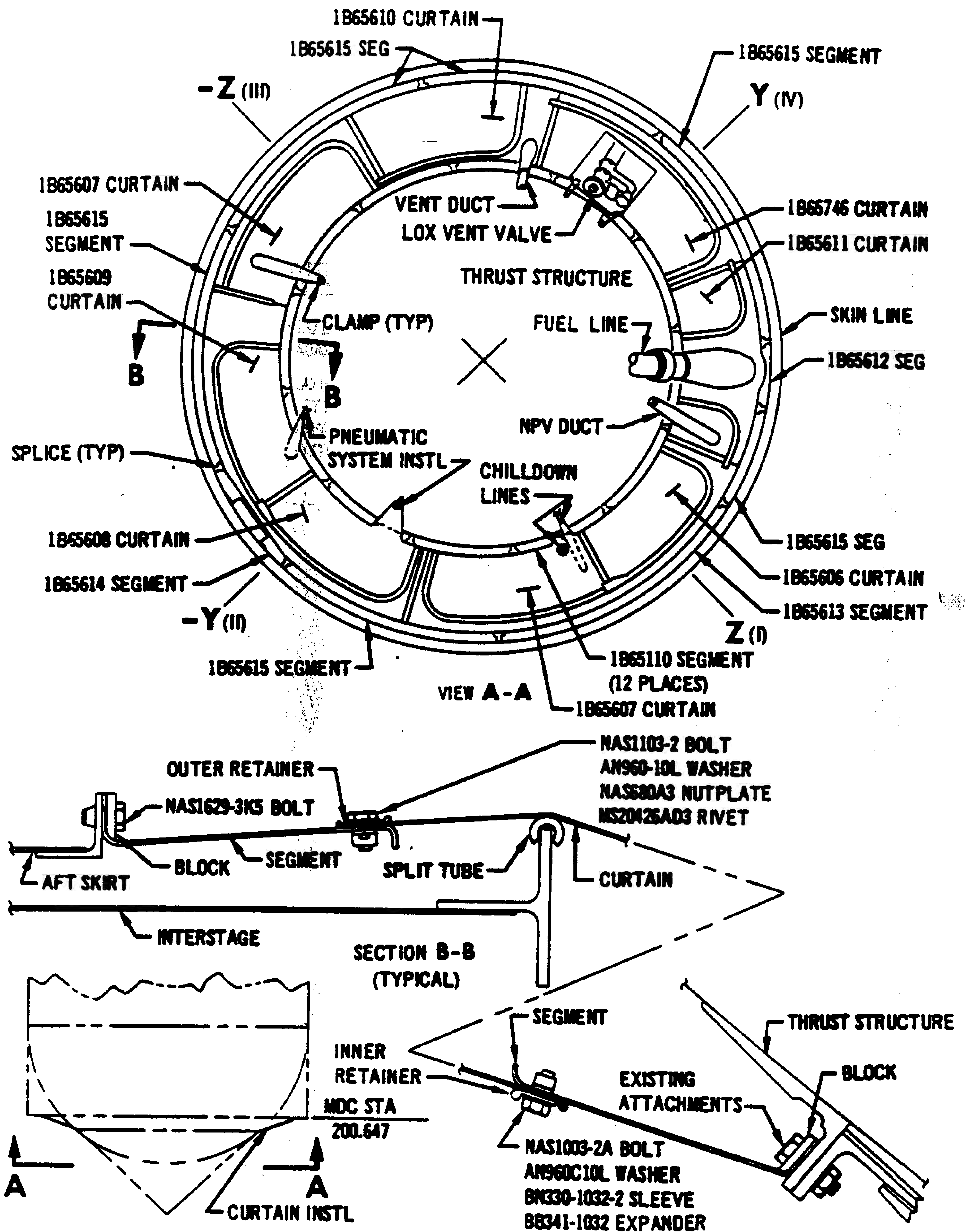
VIEW E-E  
(FROM PAGE 2)





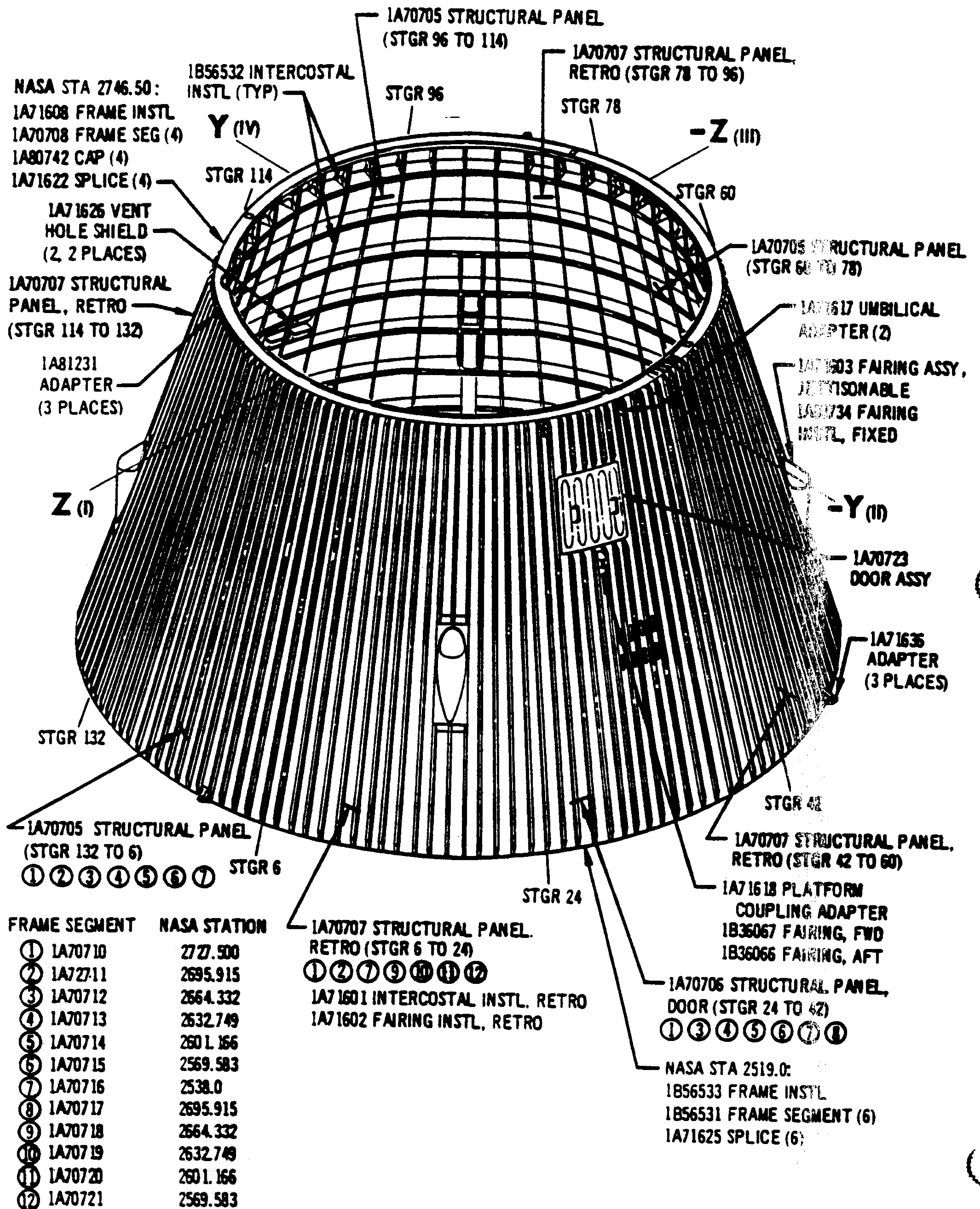
TANK TO AFT SKIRT - JOINT DETAILS (1A39309)



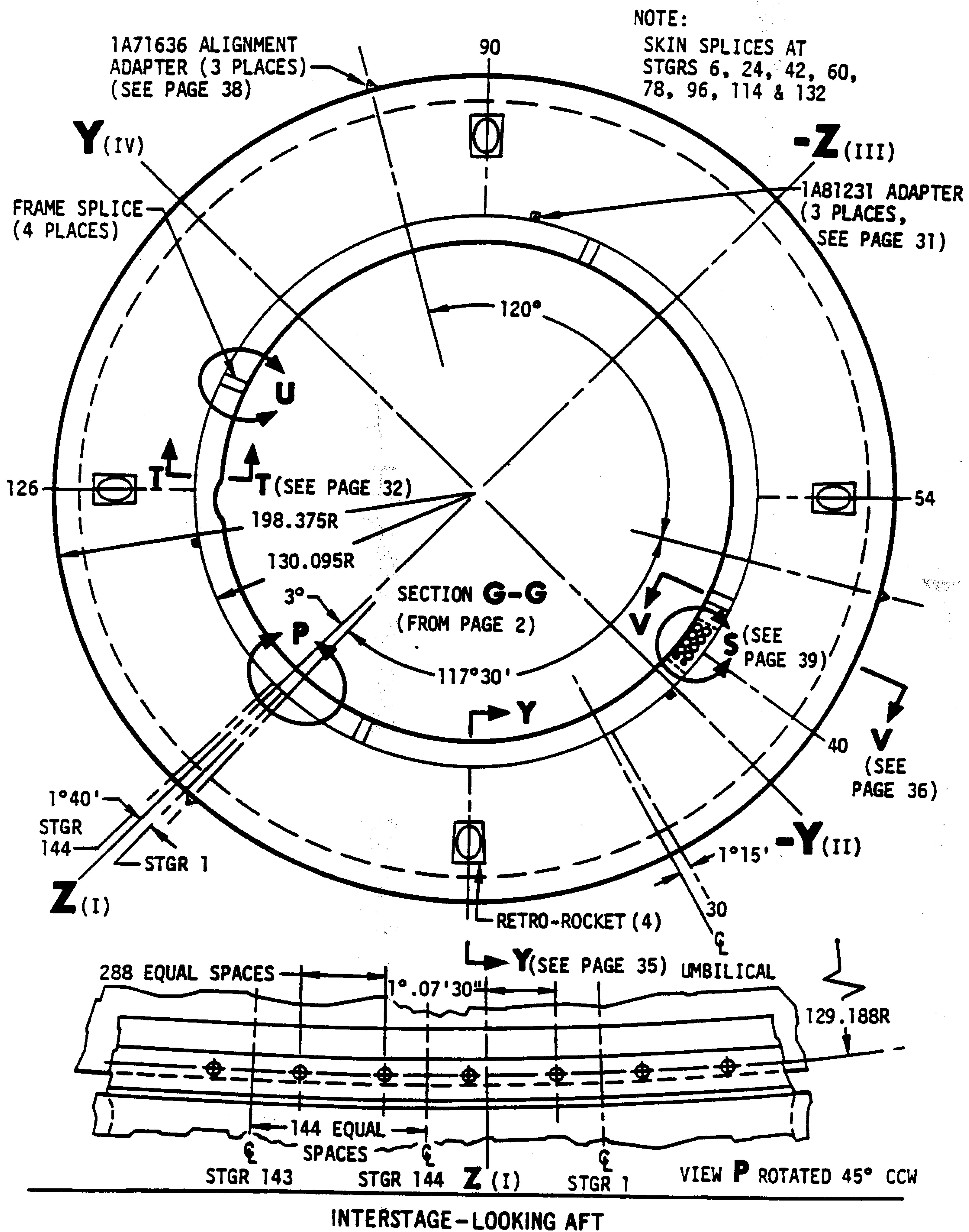


CURTAIN INSTALLATION - RETROROCKET HEAT IMPINGEMENT (1B65109)

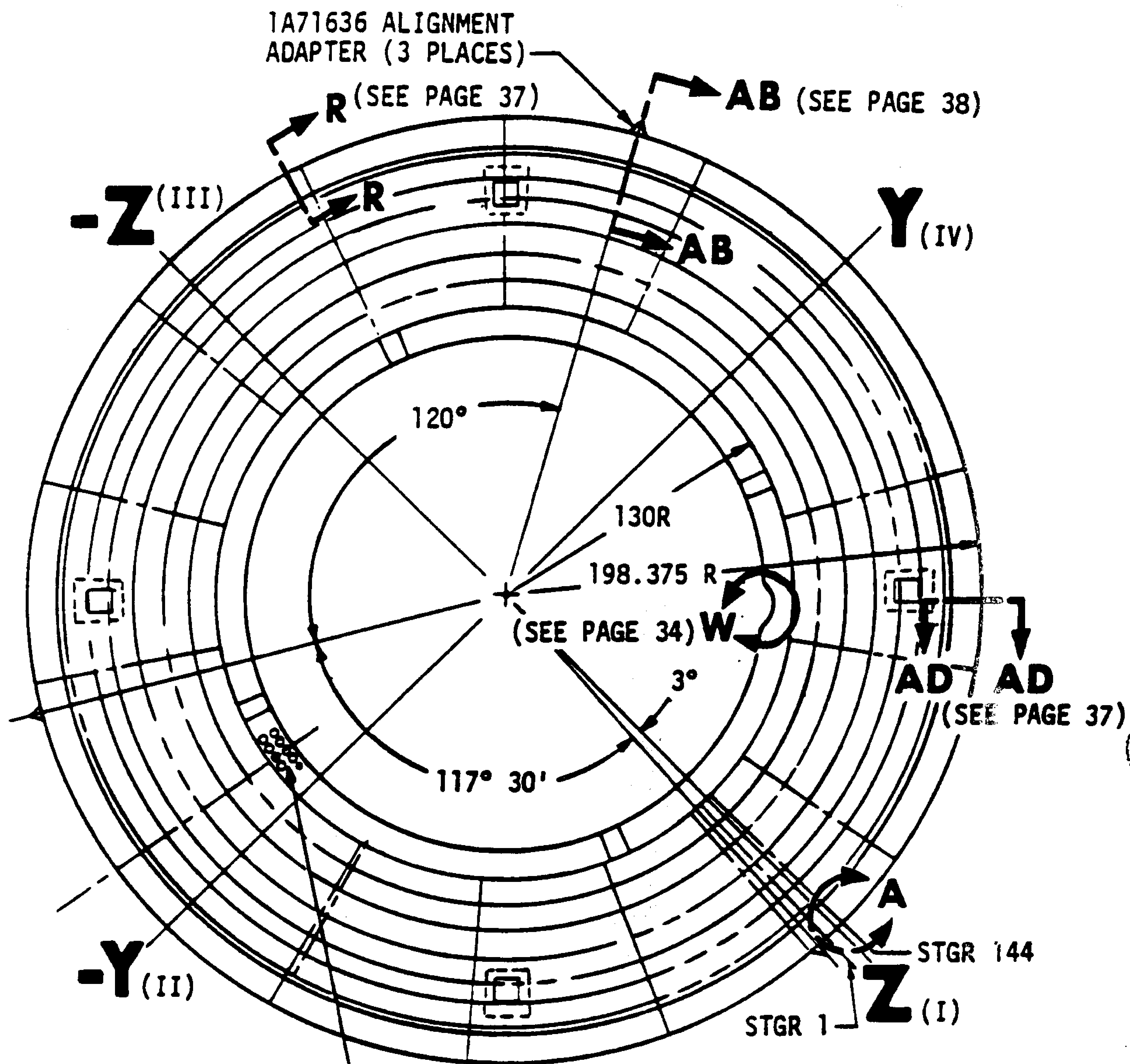








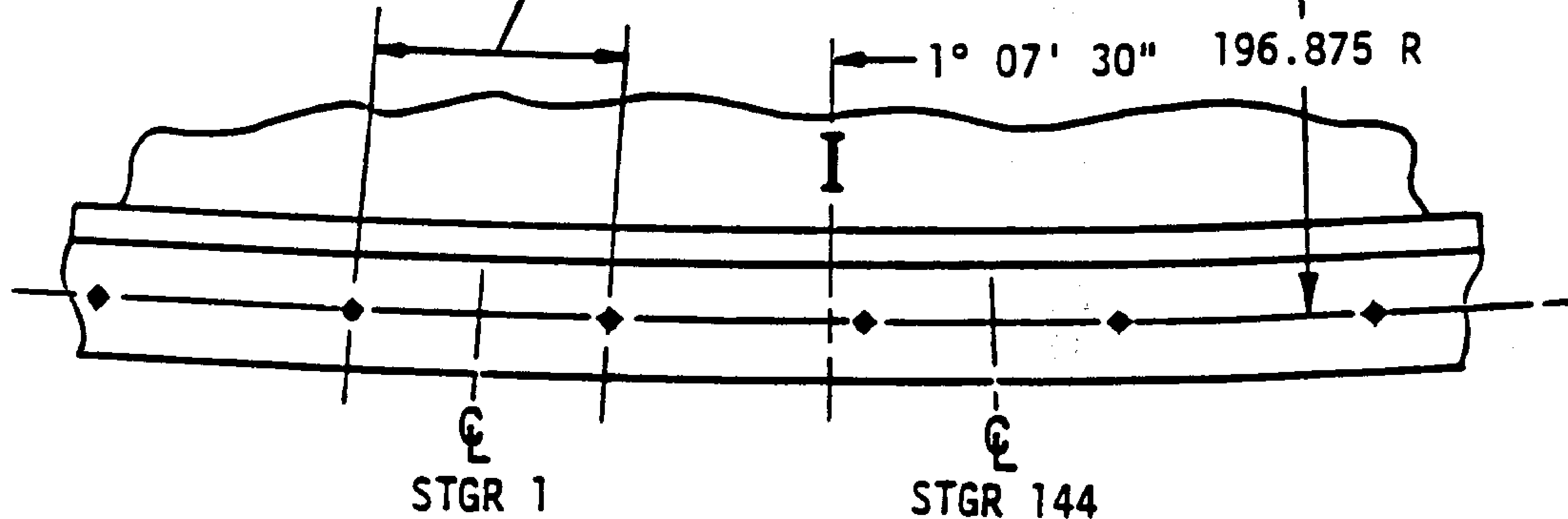




ELECTRICAL DISCONNECT  
(SEE PAGE 39)

VIEW **F-F**  
(FROM PAGE 2)

288 EQUAL SPACES

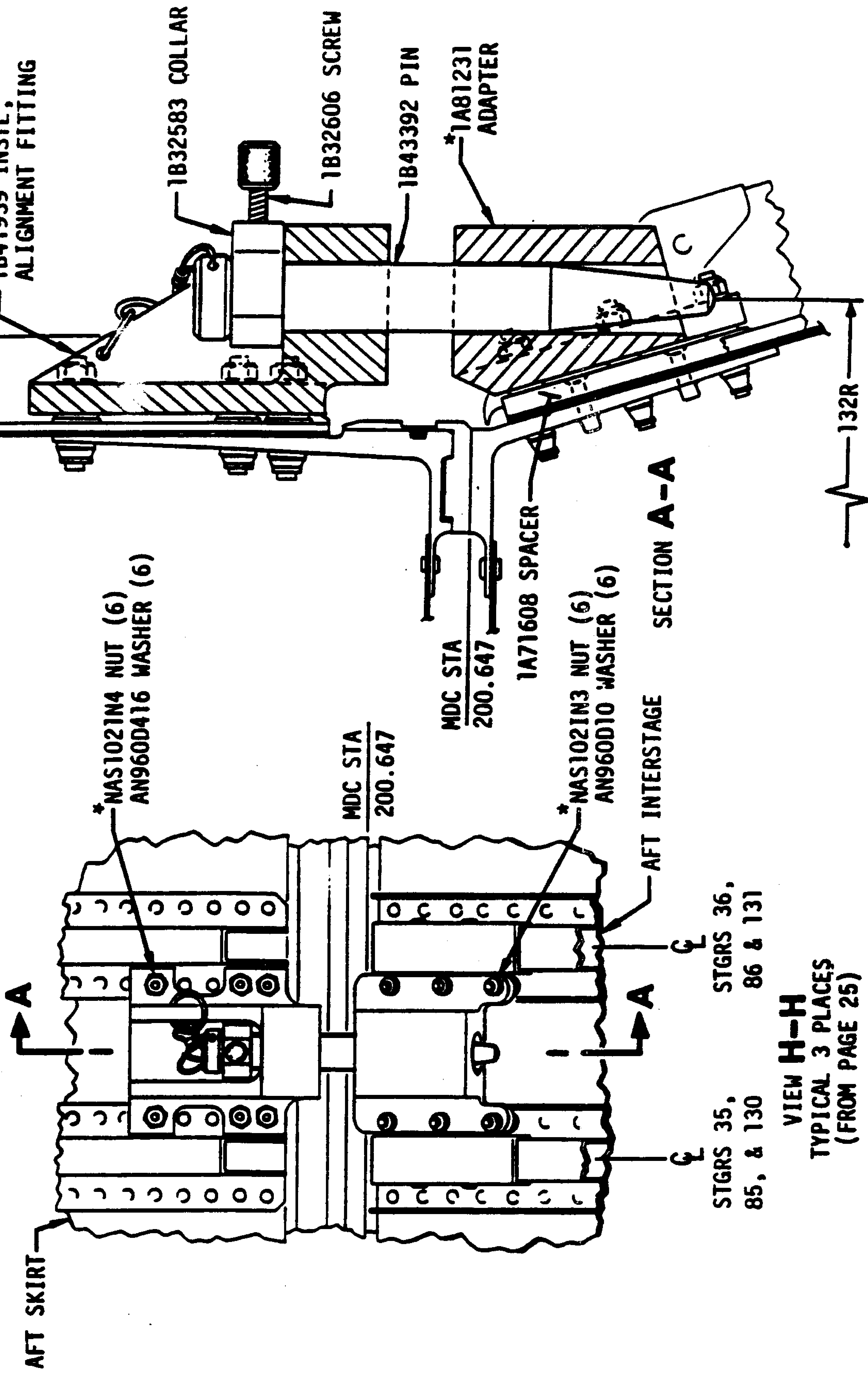


VIEW **A** (ROTATED 45° CW)

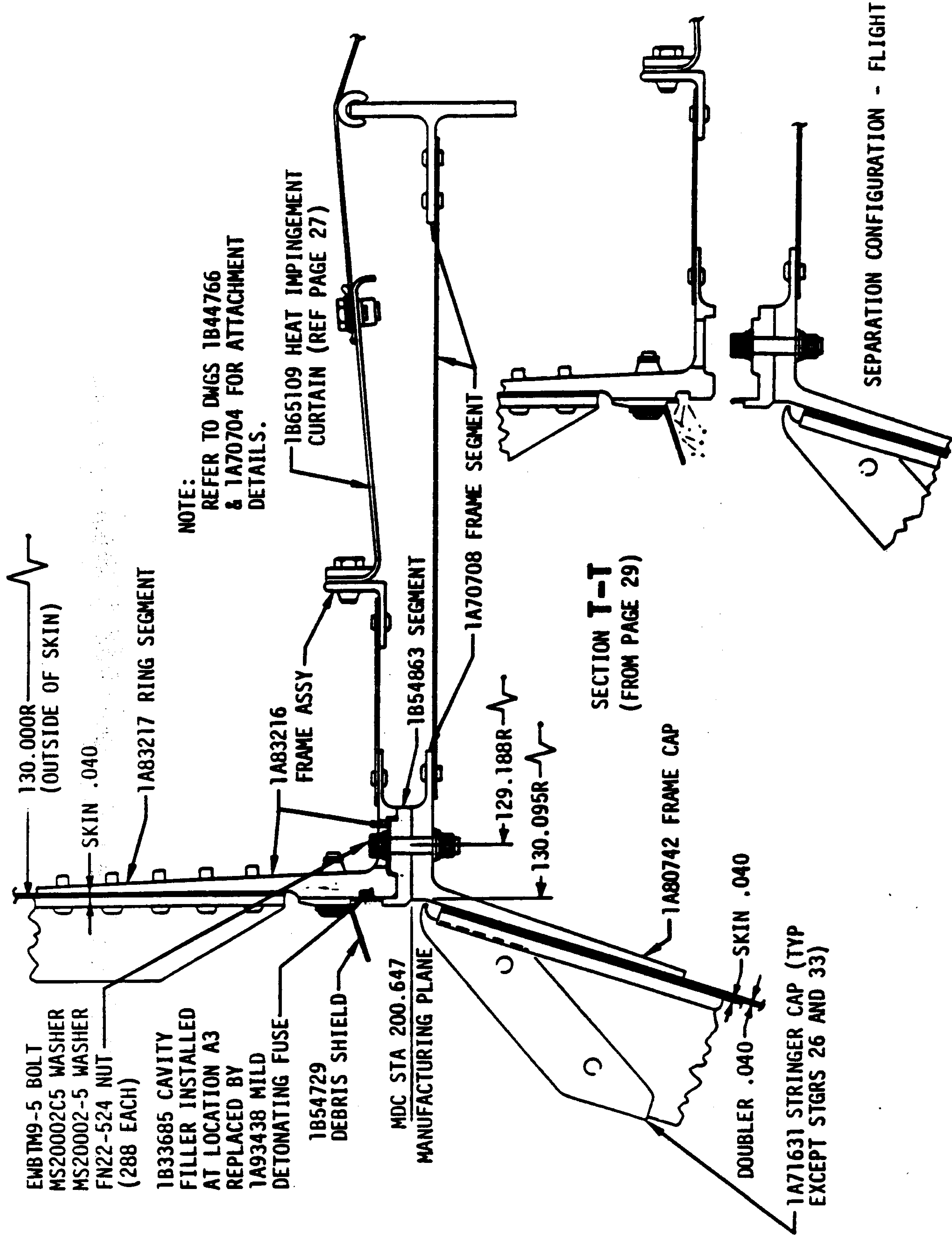
INTERSTAGE - LOOKING FORWARD



\*FITTINGS AND ADAPTERS INSTALLED AT A3 PER  
1B41939 AND 1A71608 INSTL DMGS. AFTER  
STAGING REMOVE NUTS, WASHERS, FITTINGS  
AND ADAPTERS PER TCP O-V-24073.

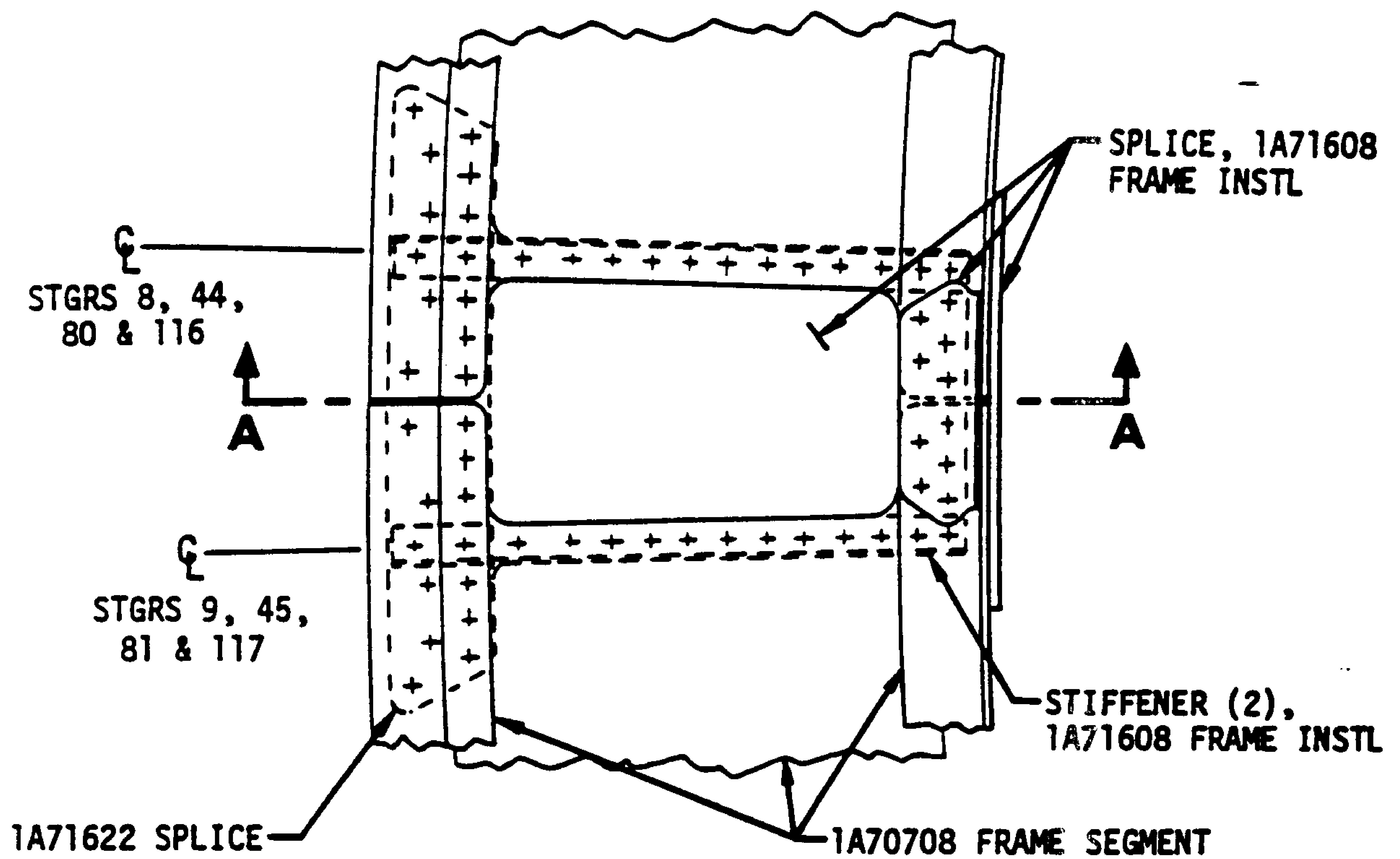




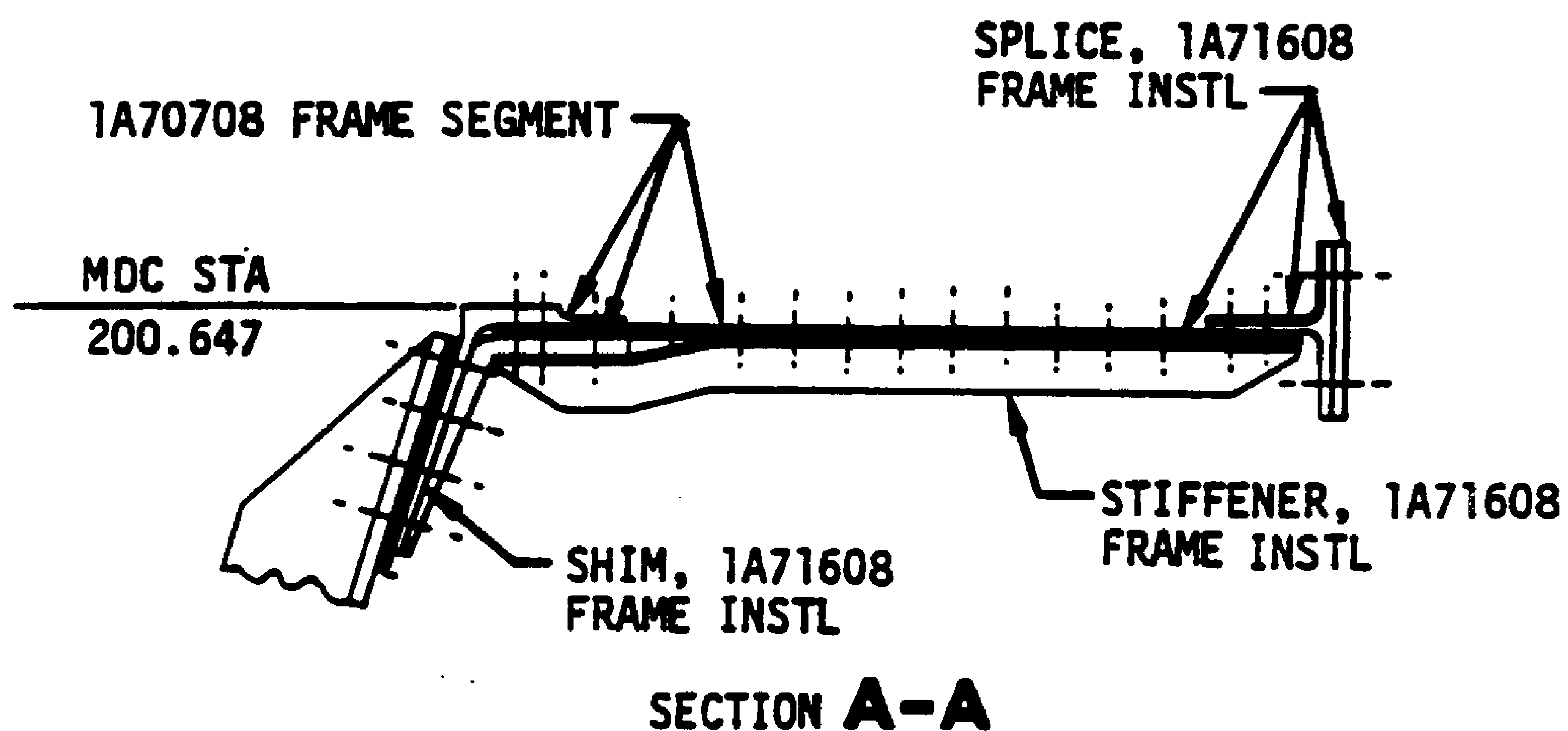


INTERSTAGE TO AFT SKIRT - DETAIL



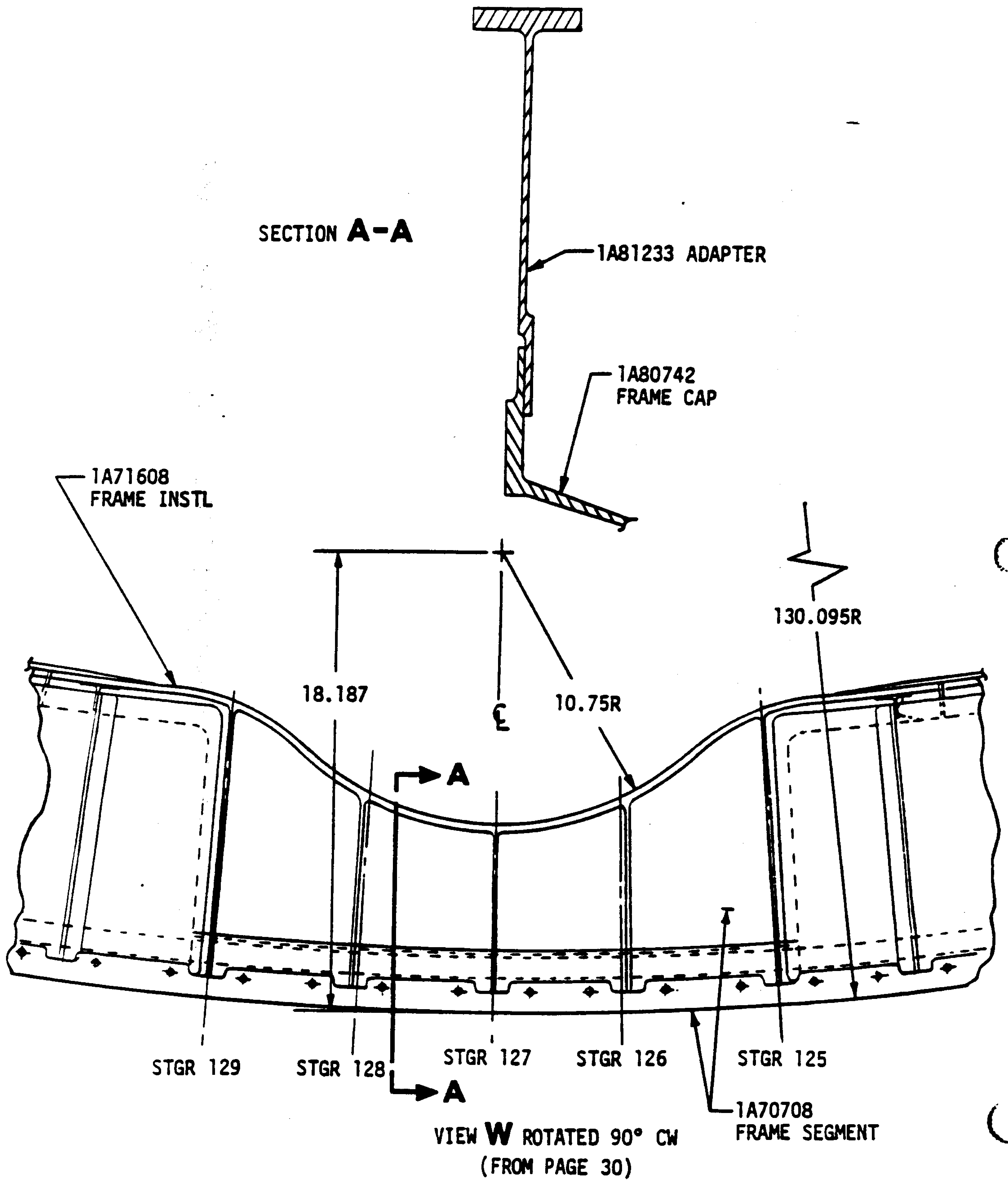


**VIEW U**  
 TYPICAL SPLICE BETWEEN STGRS  
 8 & 9, 44 & 45, 80 & 81 AND 116 & 117  
 (FROM PAGE 29)



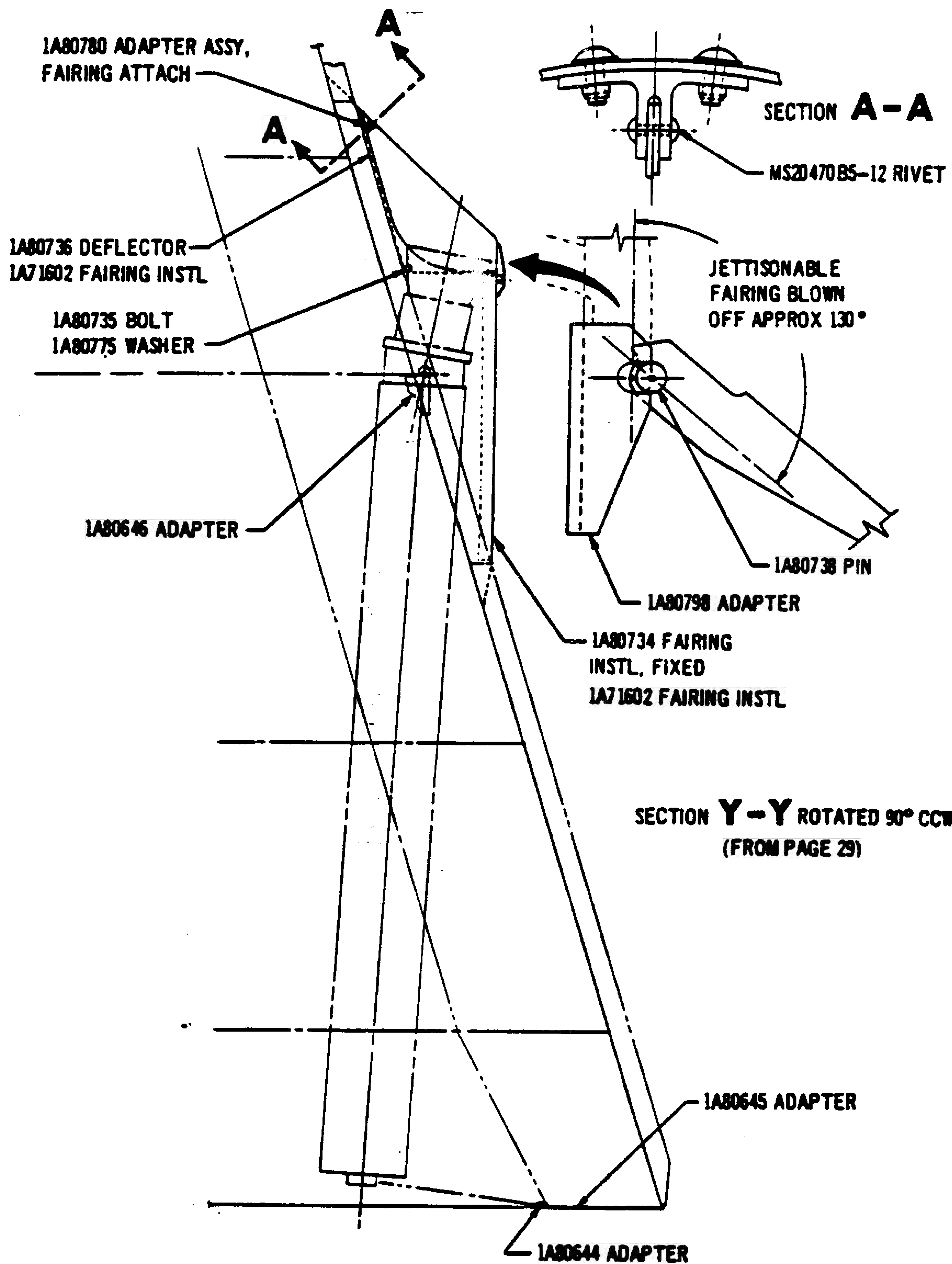
**INTERSTAGE, FORWARD FRAME - SPLICE DETAIL**





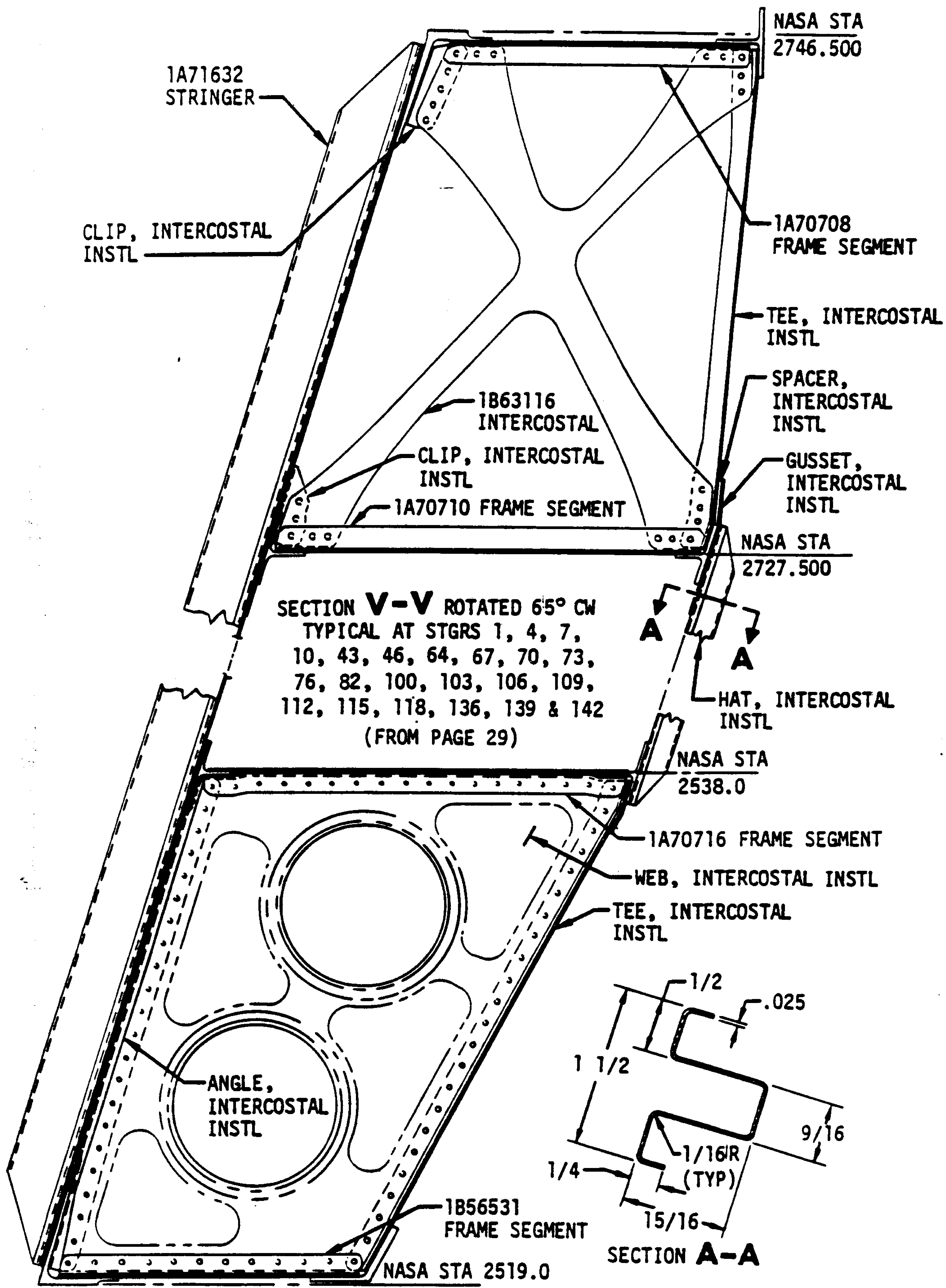
INTERSTAGE - FRAME CLEARANCE FOR LH<sub>2</sub> FEED LINE





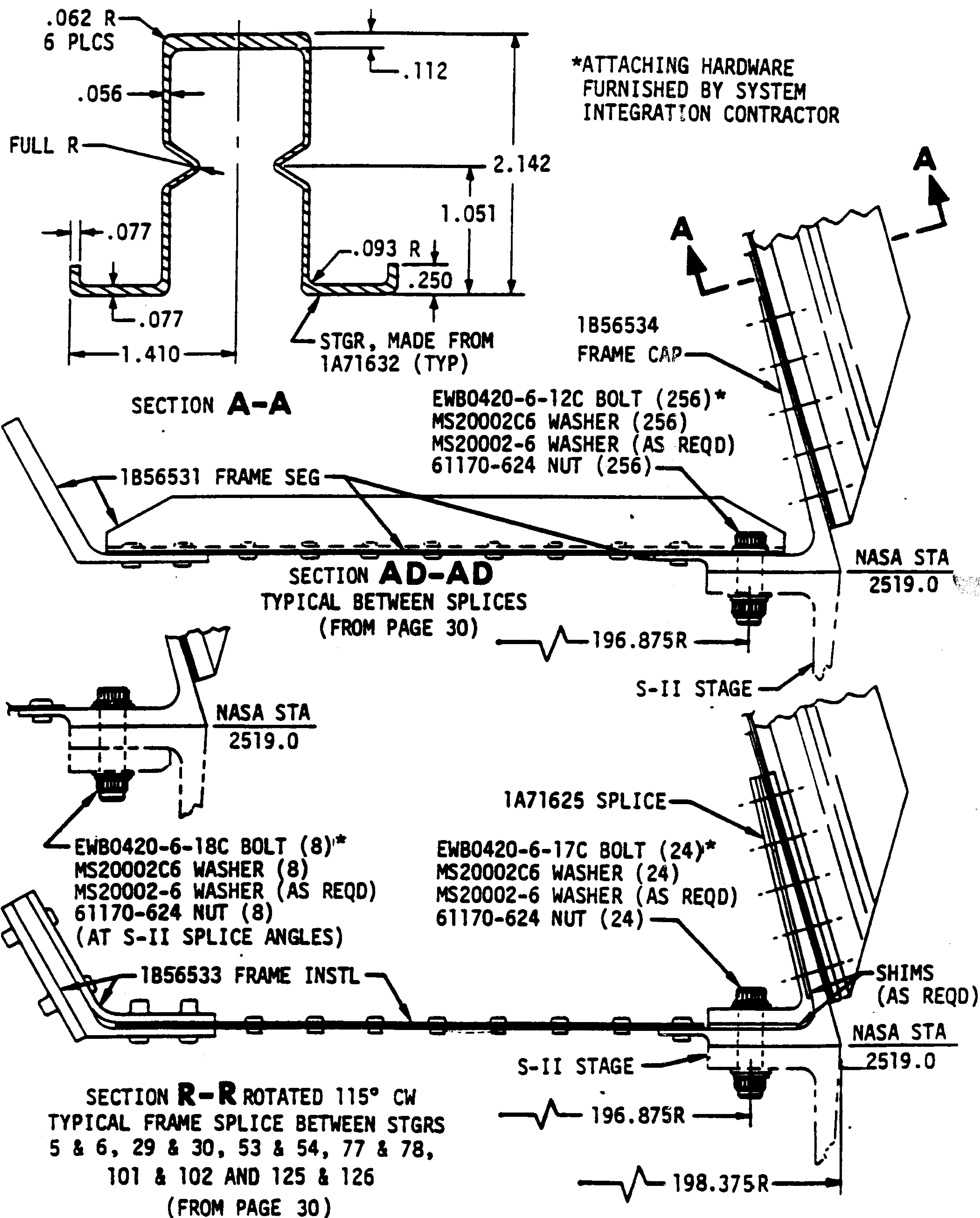
RETROCKET SUPPORT INSTALLATION (1A80638)





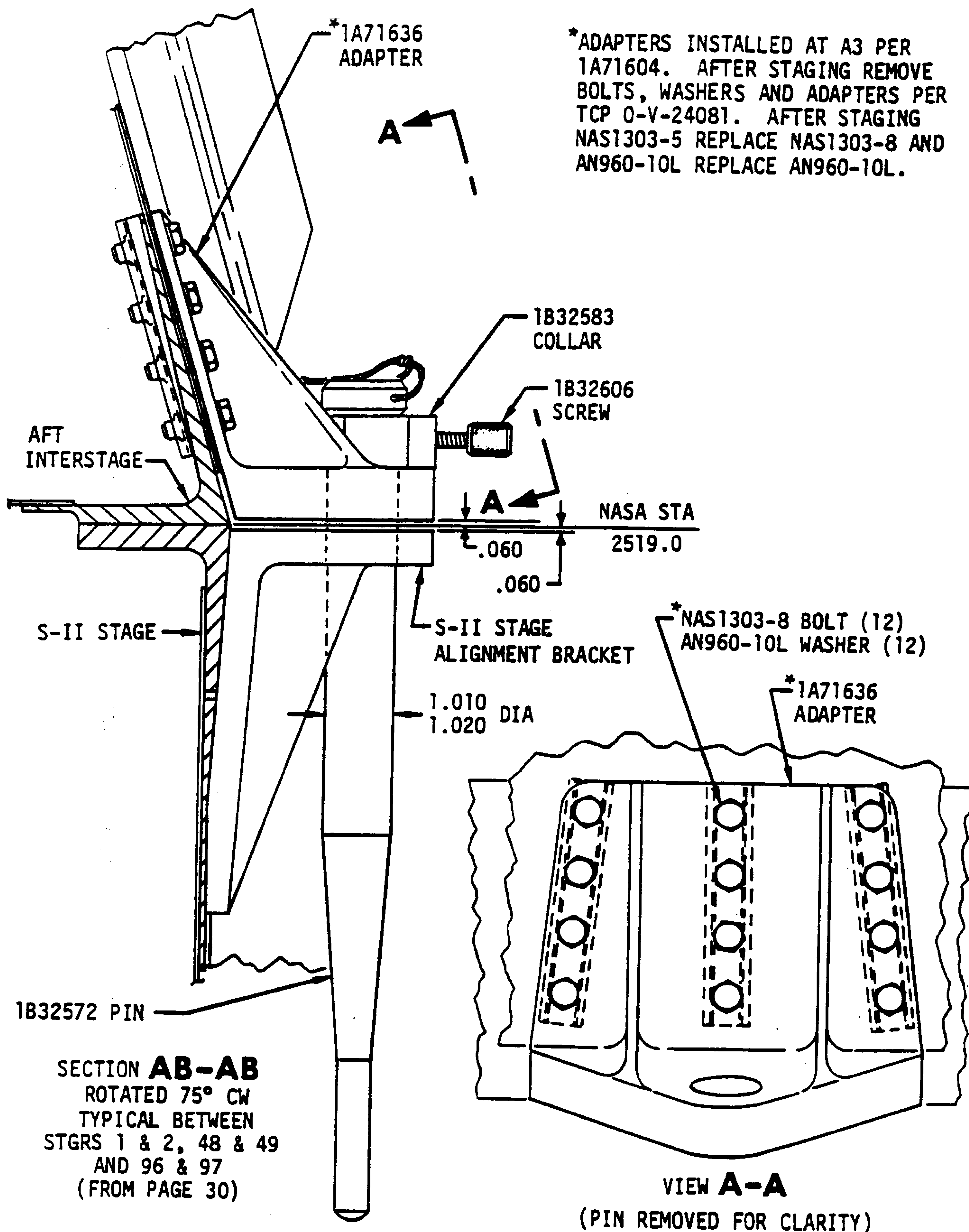
INTERSTAGE INTERCOSTAL INSTALLATION (1B56532)





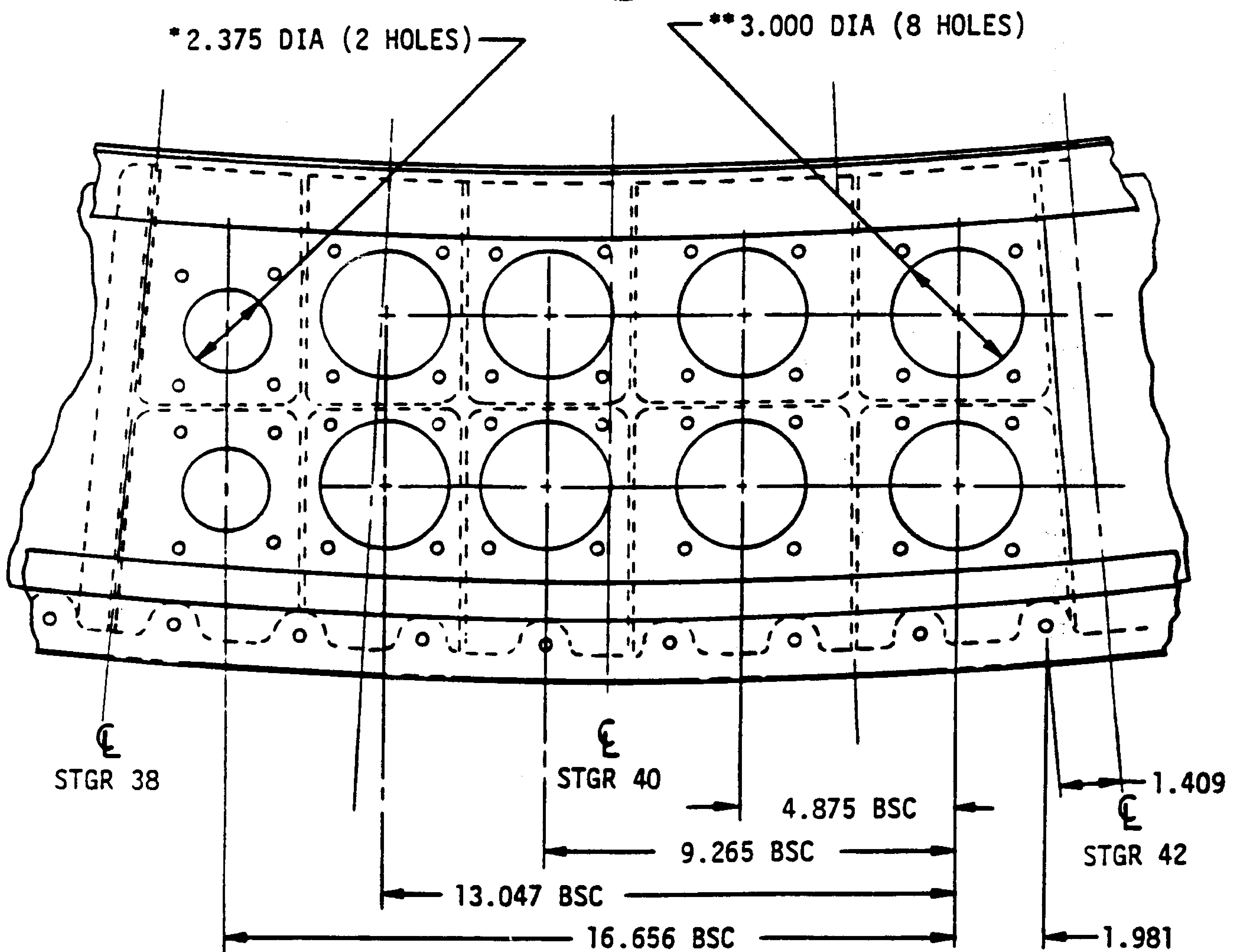
INTERSTAGE, AFT ANGLE - DETAIL





ALIGNMENT - INTERSTAGE TO S-II STAGE



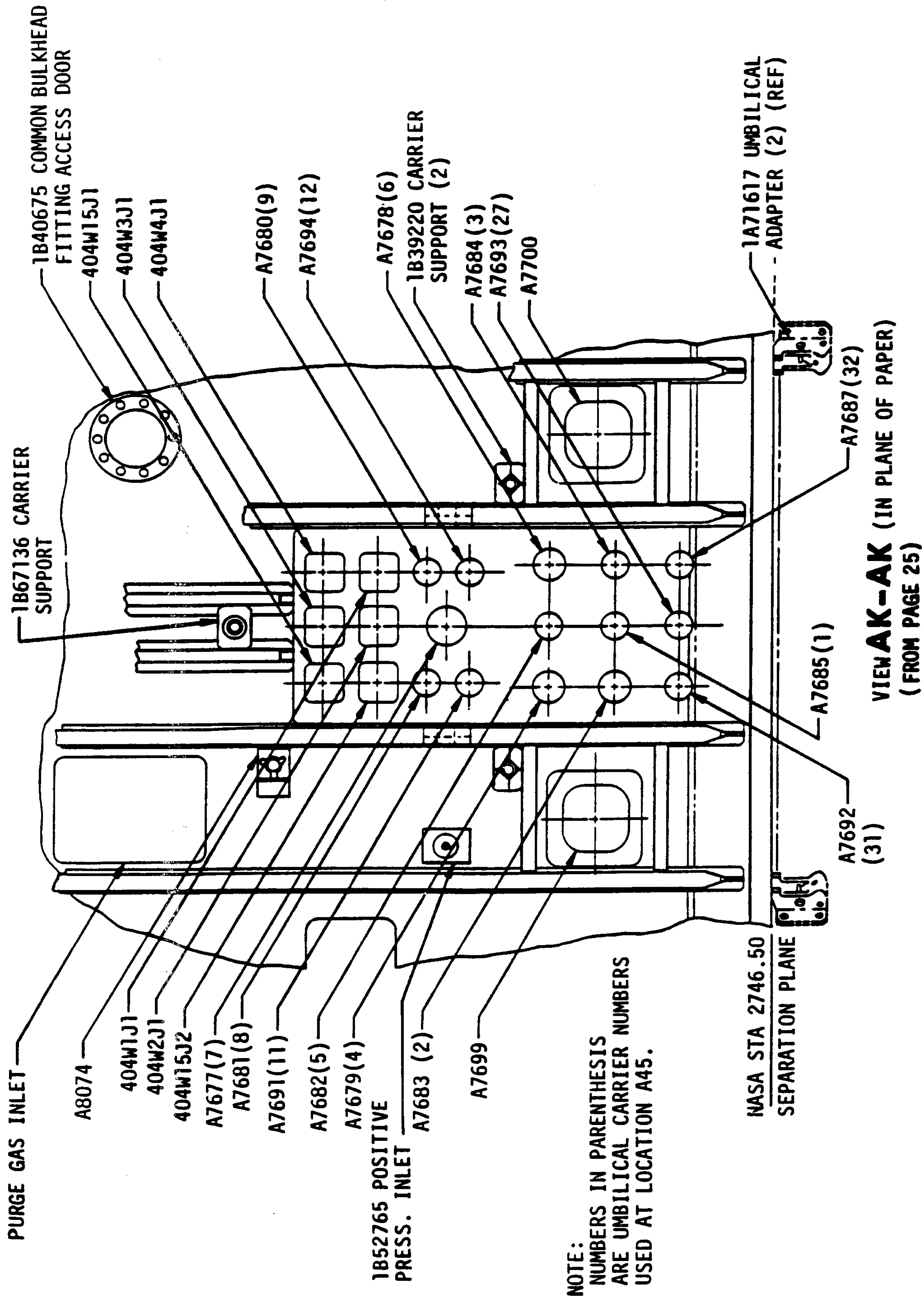


VIEW **S** ROTATED 55° CW  
(FROM PAGE 29)

AFT SKIRT HOLES

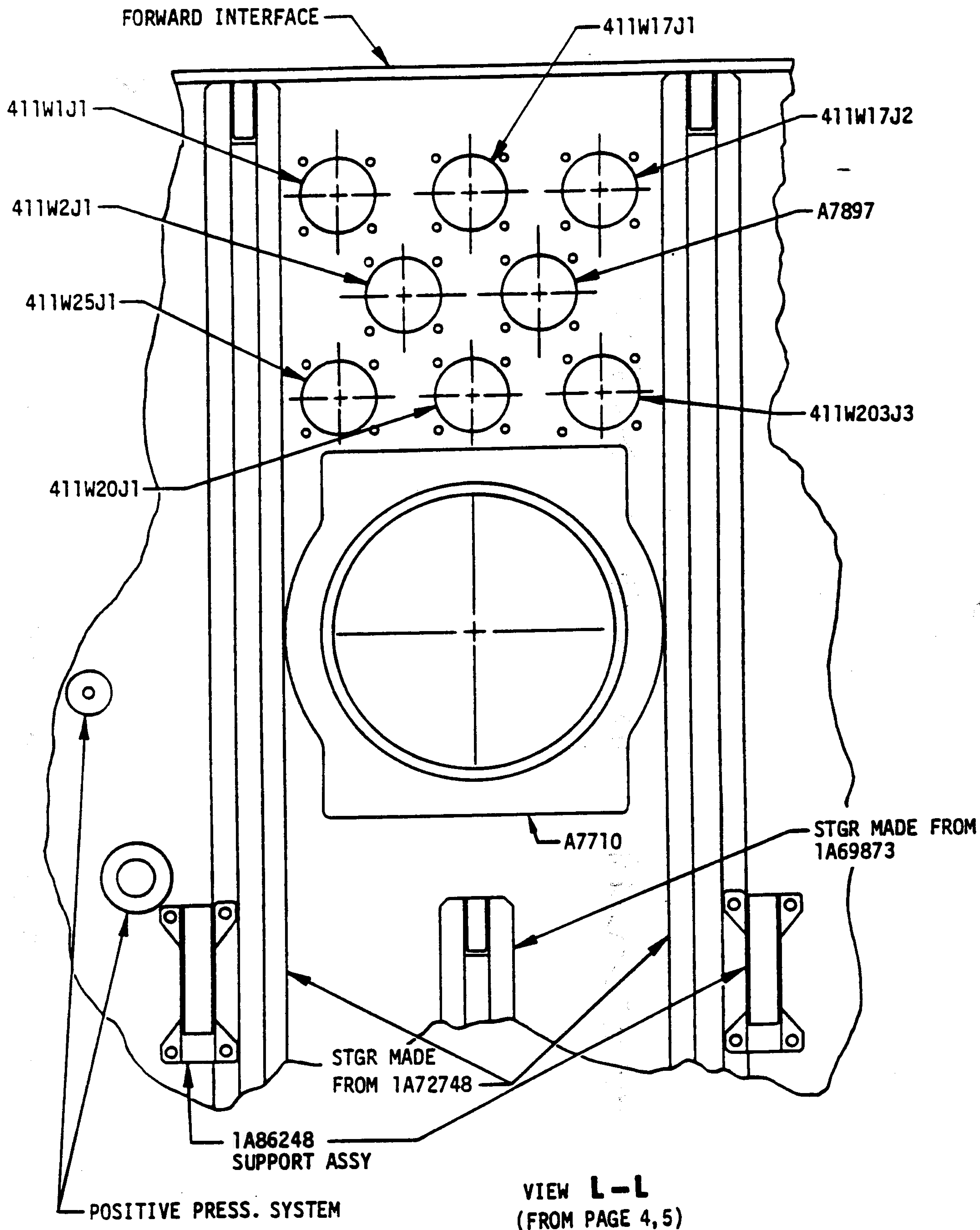
- \* 2.937 DIA
- \*\* 1.437 DIA





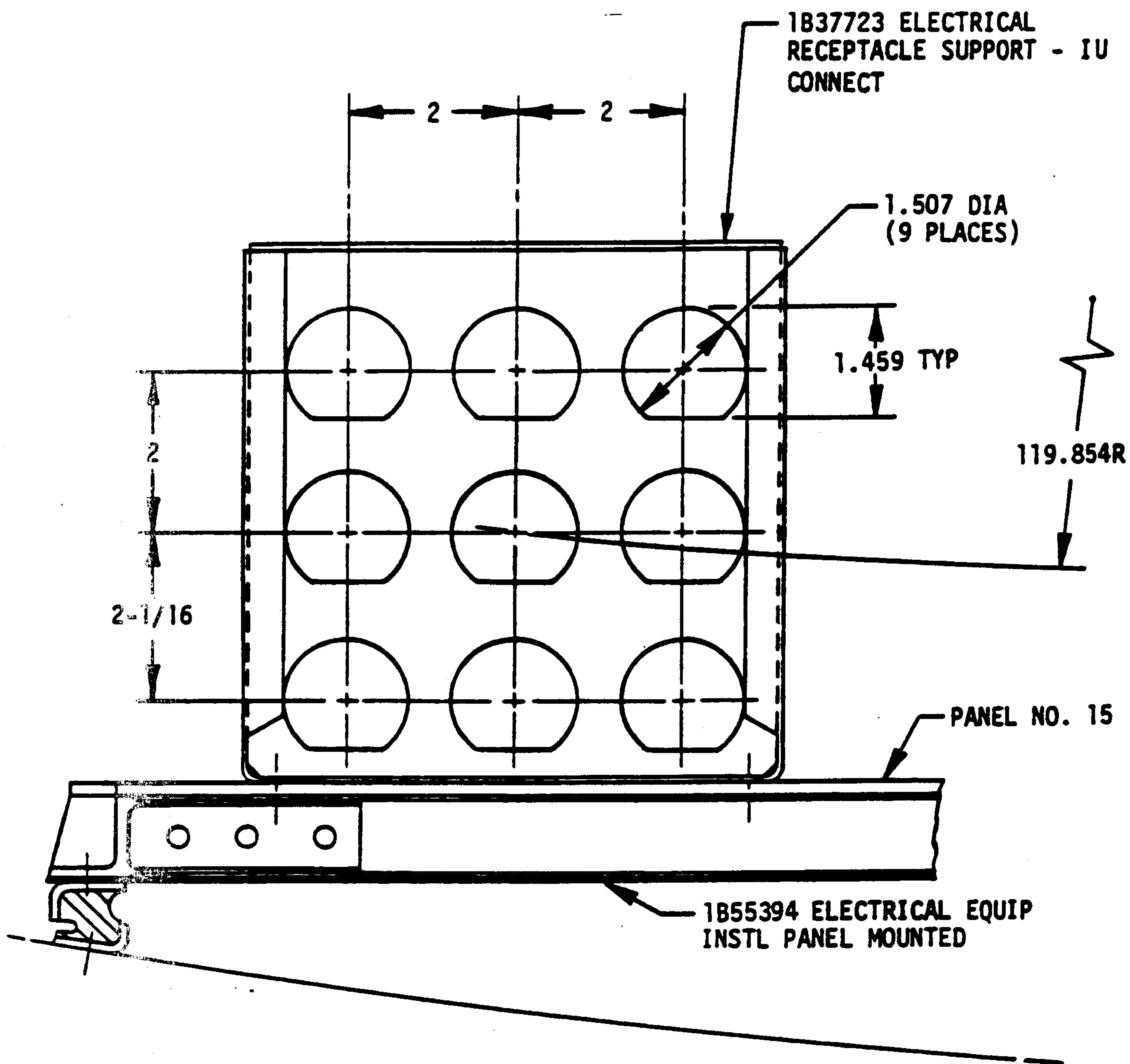
UMBILICAL PANEL INSTALLATION, AFT SKIRT (1A87847)





PANEL - FORWARD SKIRT UMBILICAL (1A72749)

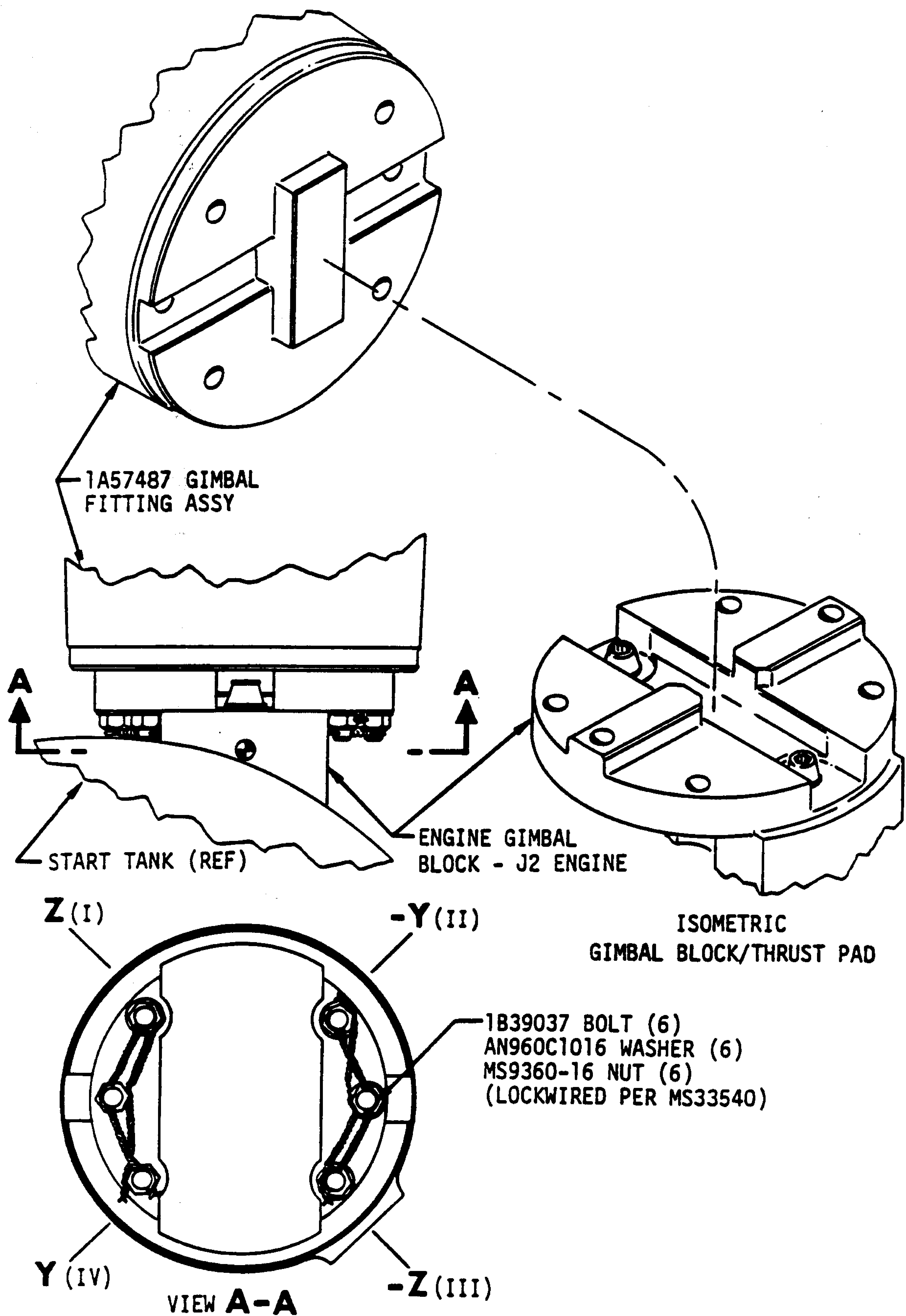




VIEW **AB** ROTATED 70° CW  
(FROM PAGE 5)

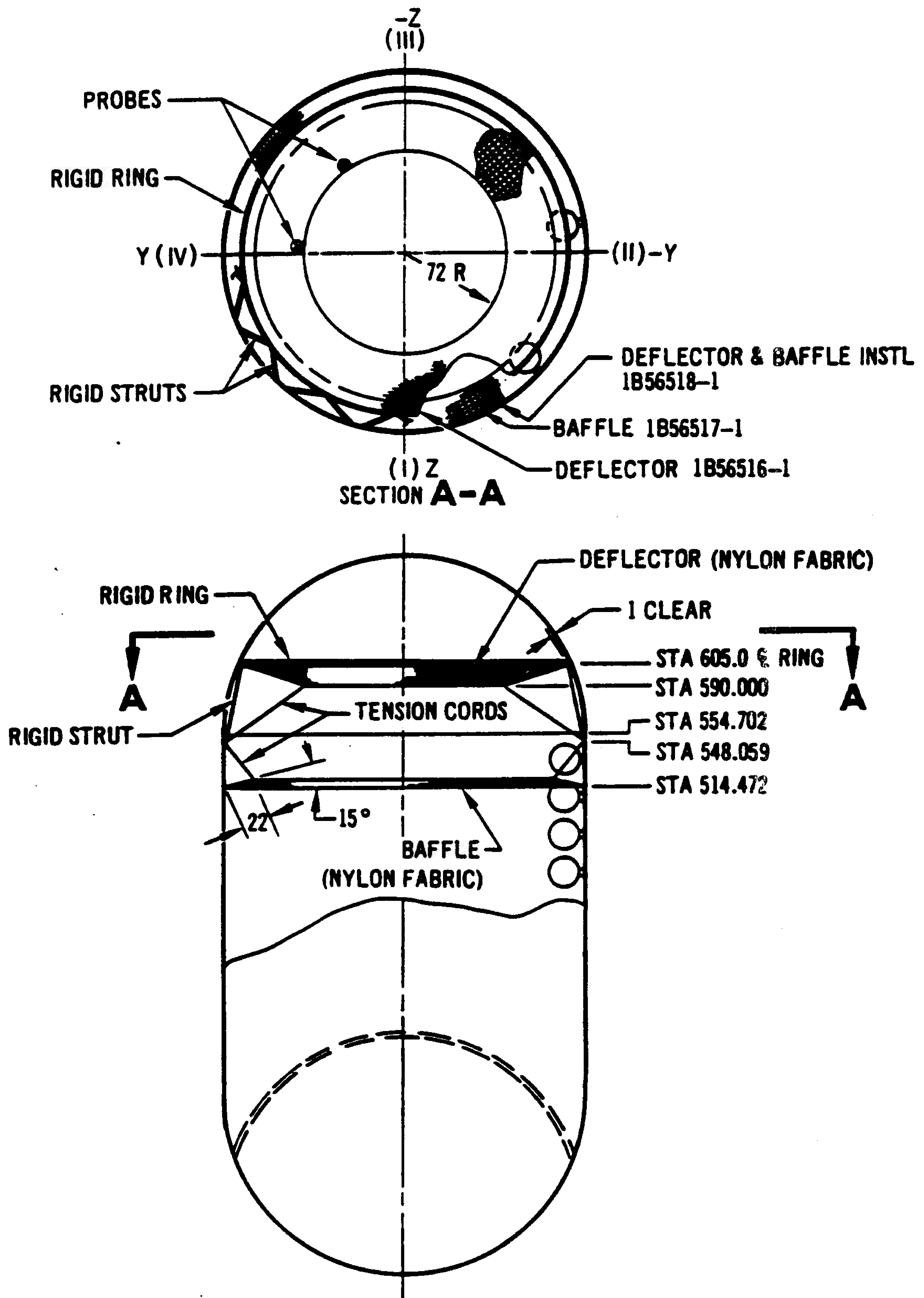
ELECTRICAL CONNECTION - S-IVB STAGE TO IU





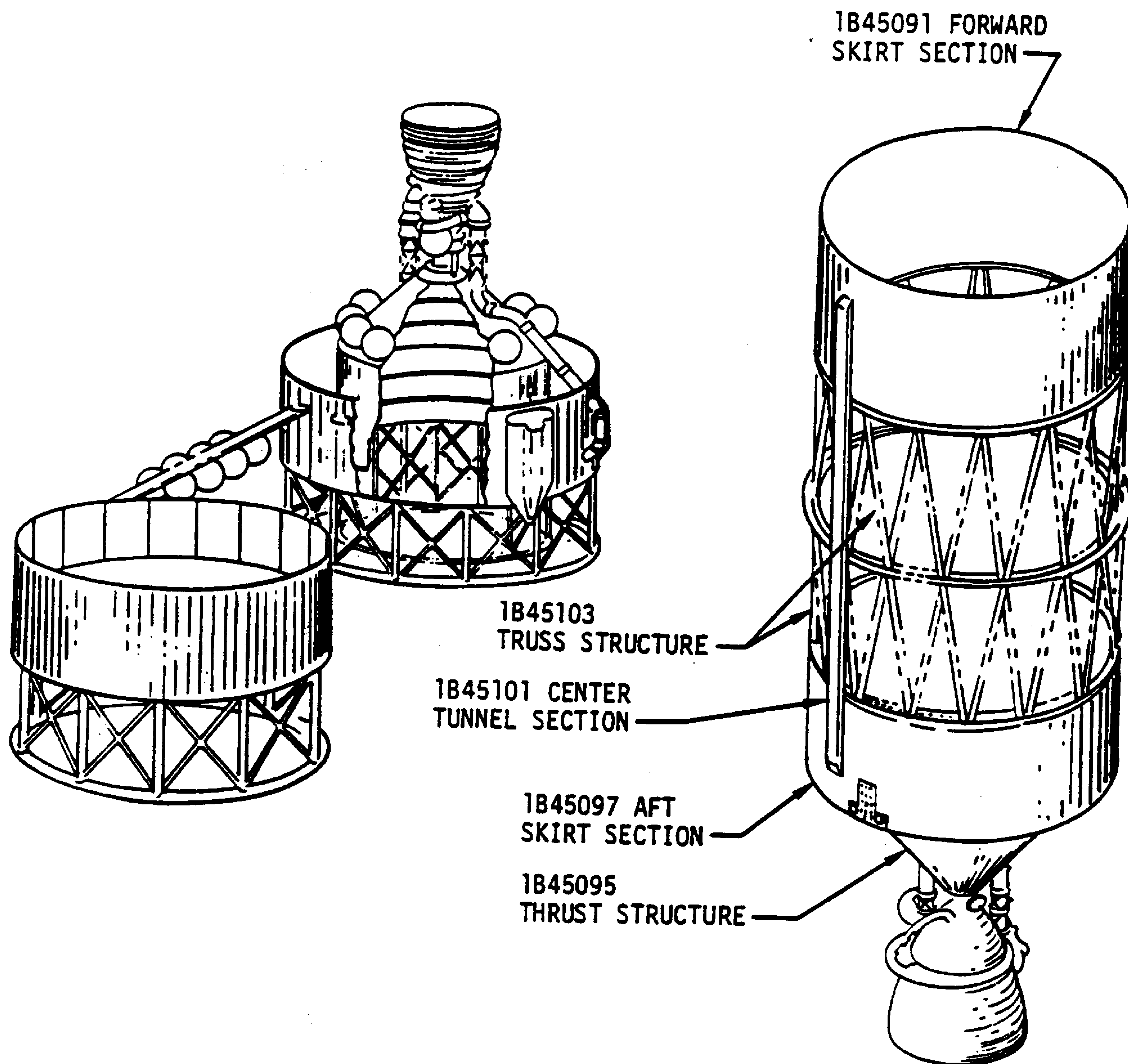
INSTALLATION - J2 ENGINE TO GIMBAL FITTING





LH<sub>2</sub> TANK BAFFLE AND DEFLECTOR (STAGES 1005 & SUBS)



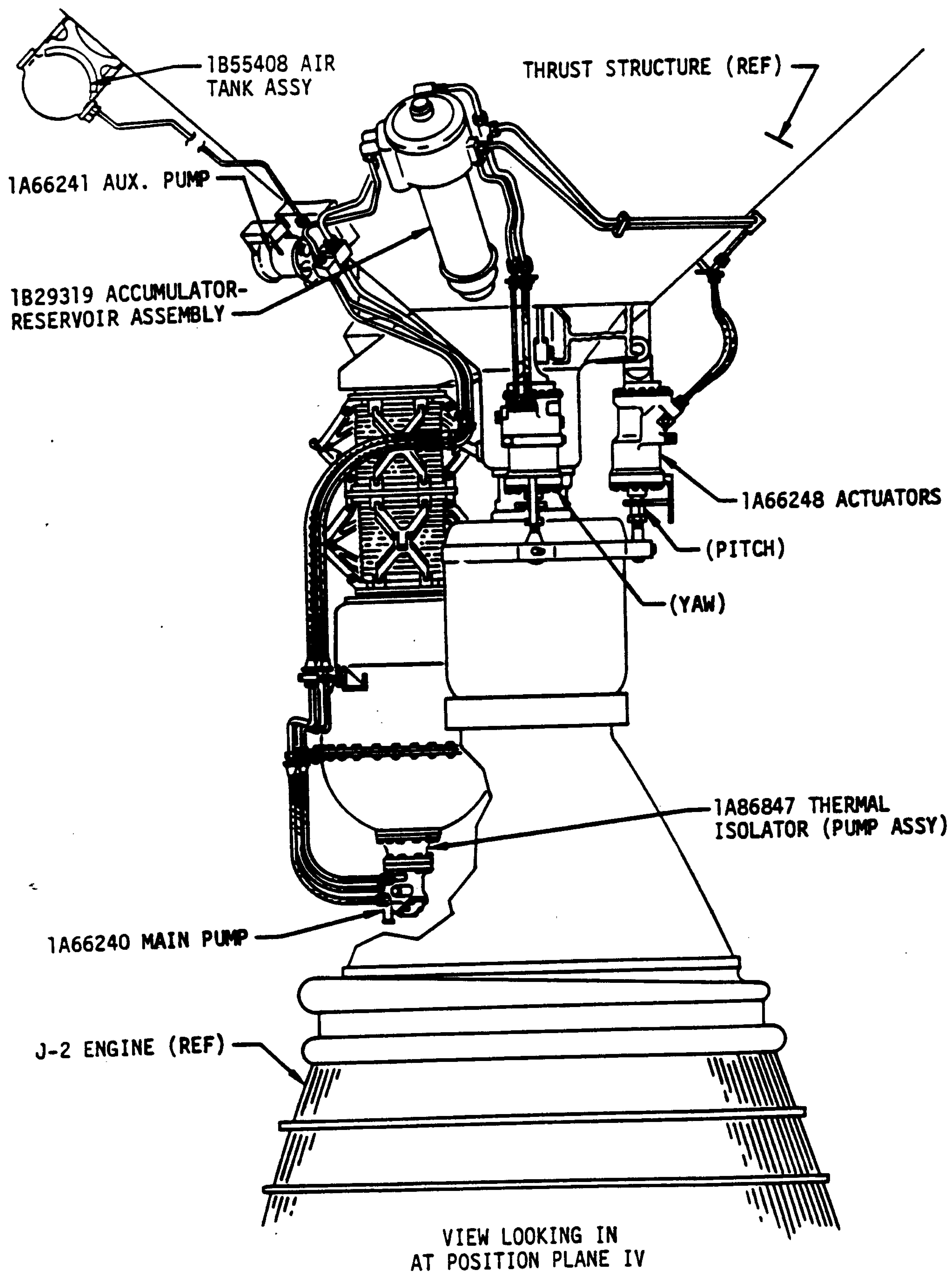


9001 SIMULATOR VEHICLE (1B45089)

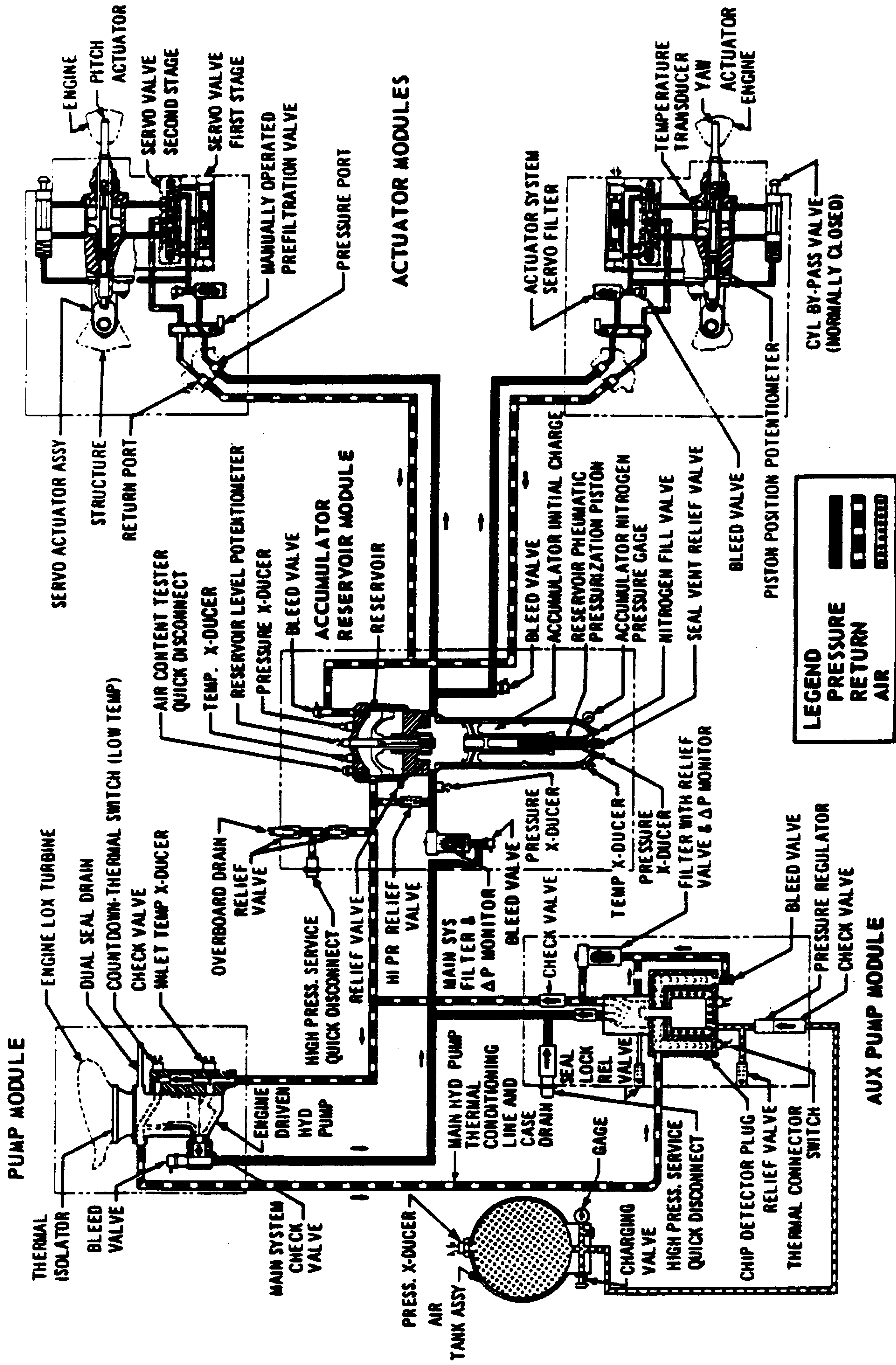


**SECTION 2**  
**HYDRAULICS**







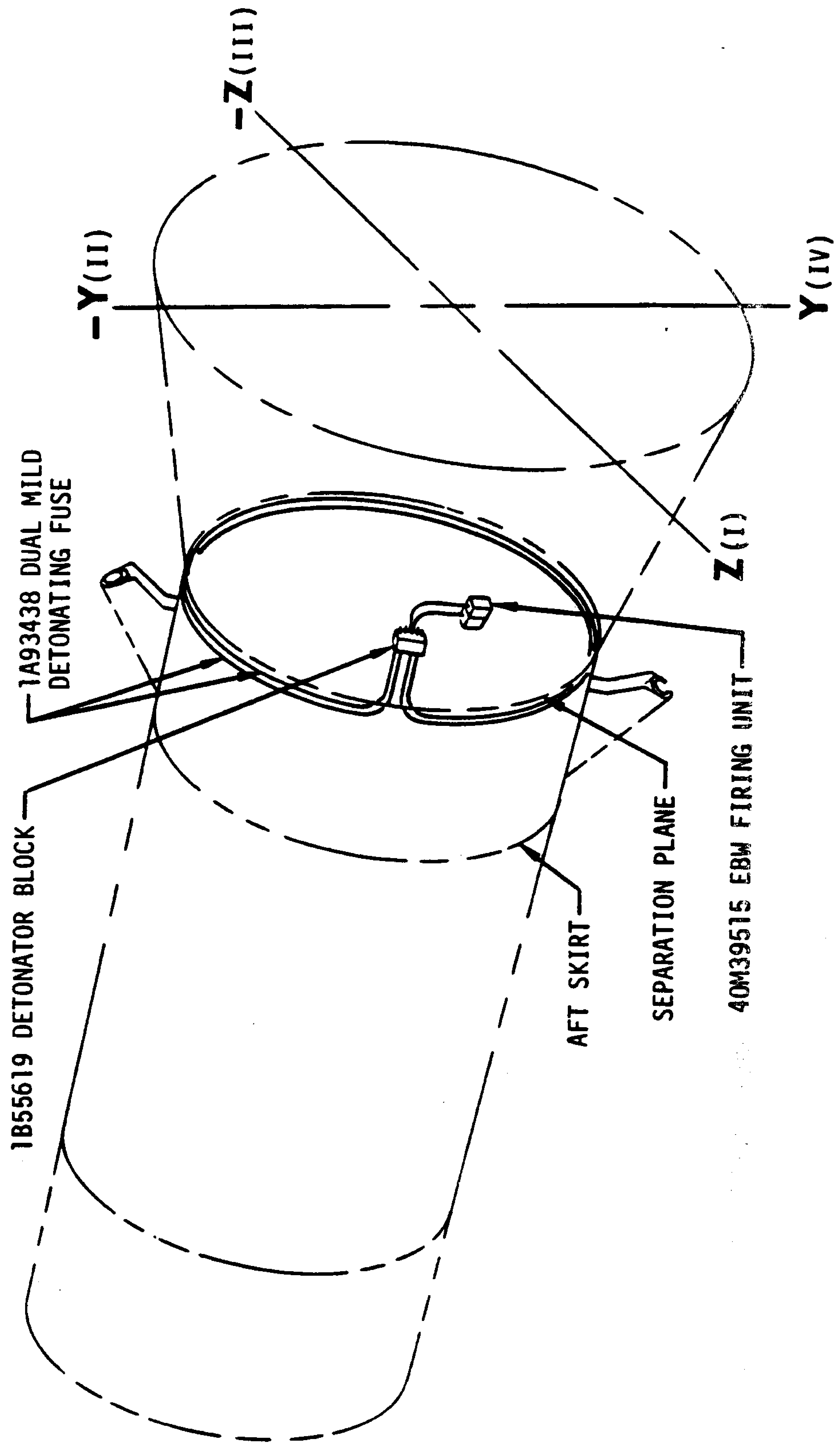


S-IVB/V HYDRAULIC SYSTEM SCHEMATIC

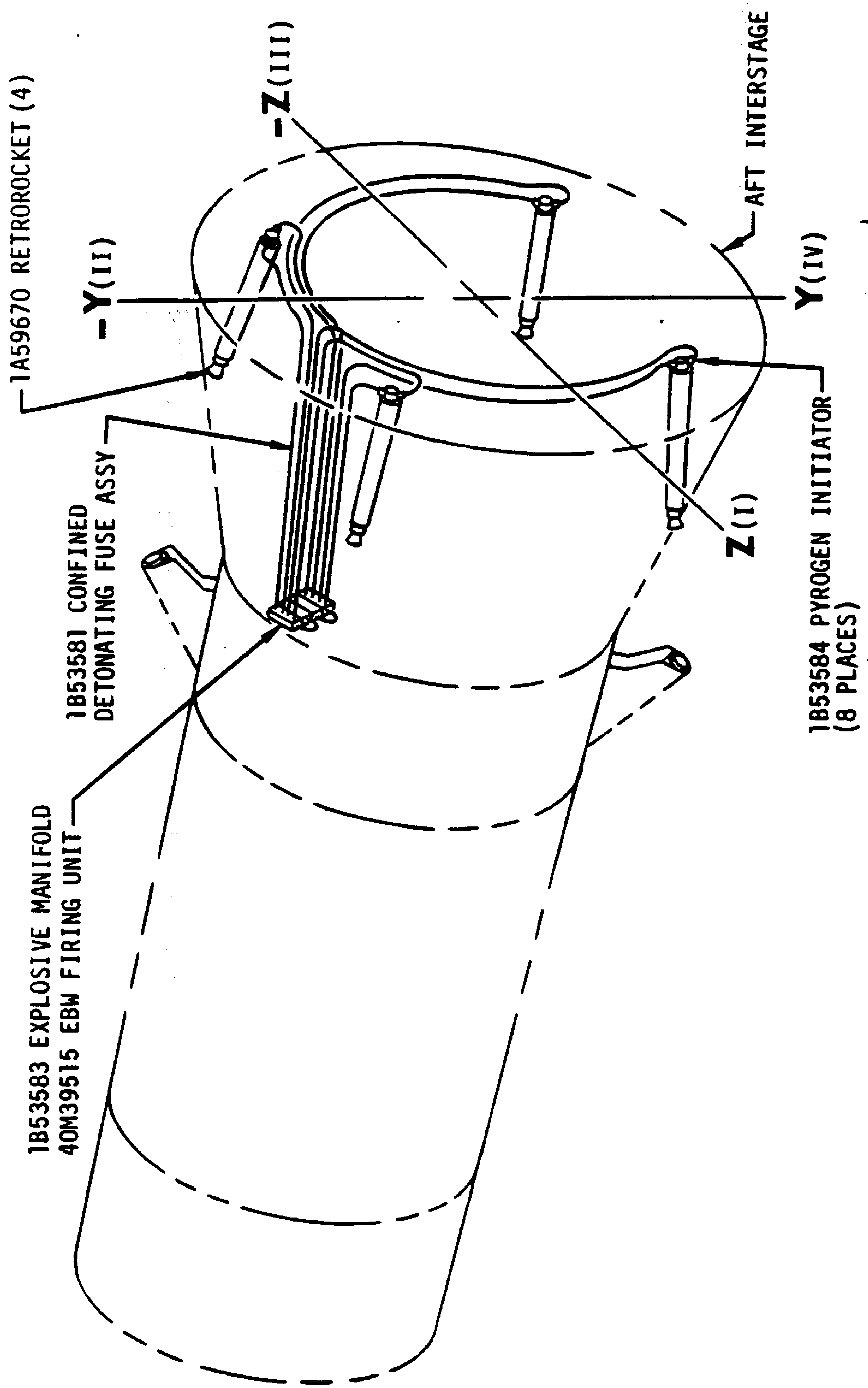


**SECTION 3**  
**ORDNANCE**



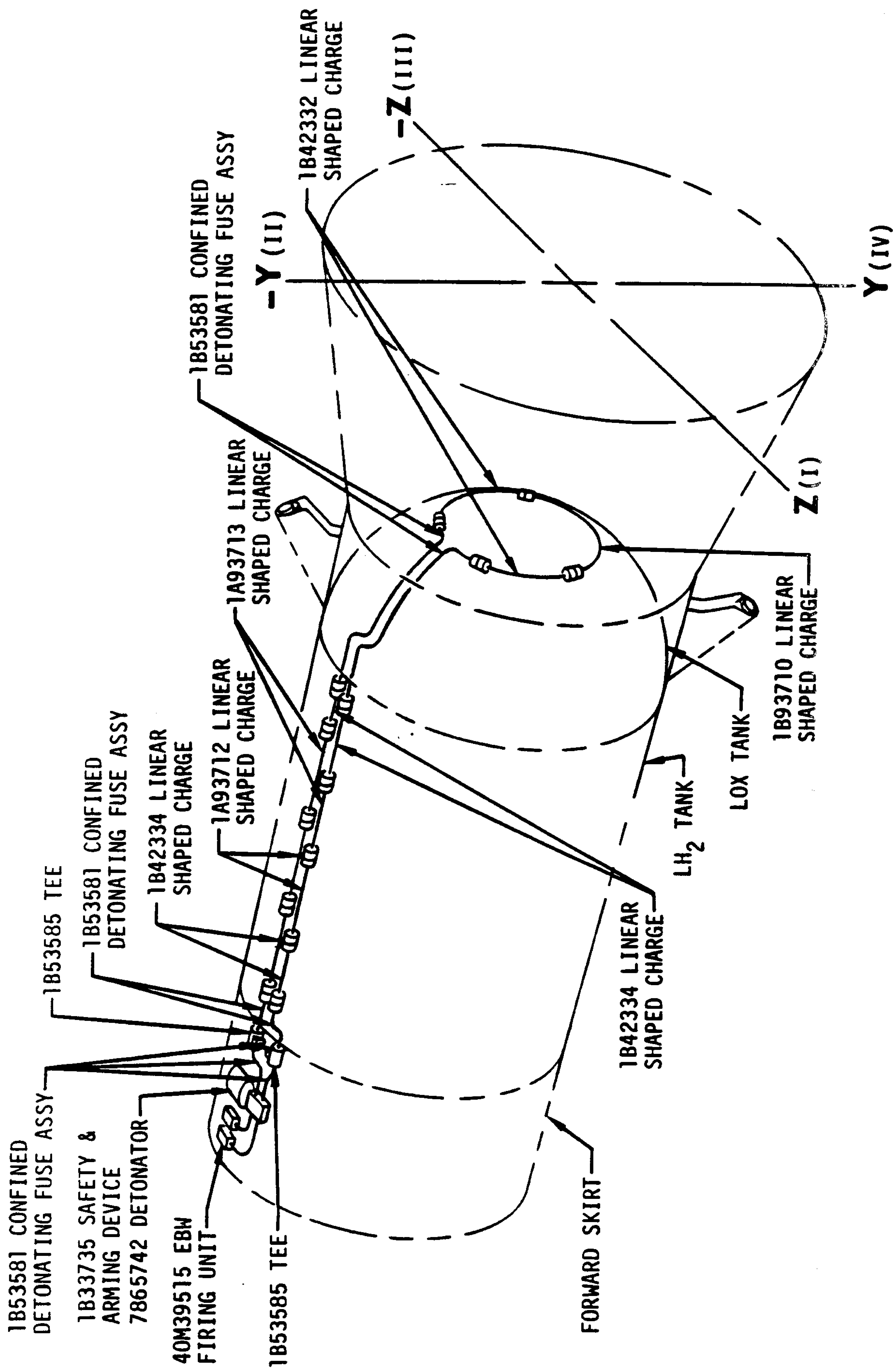




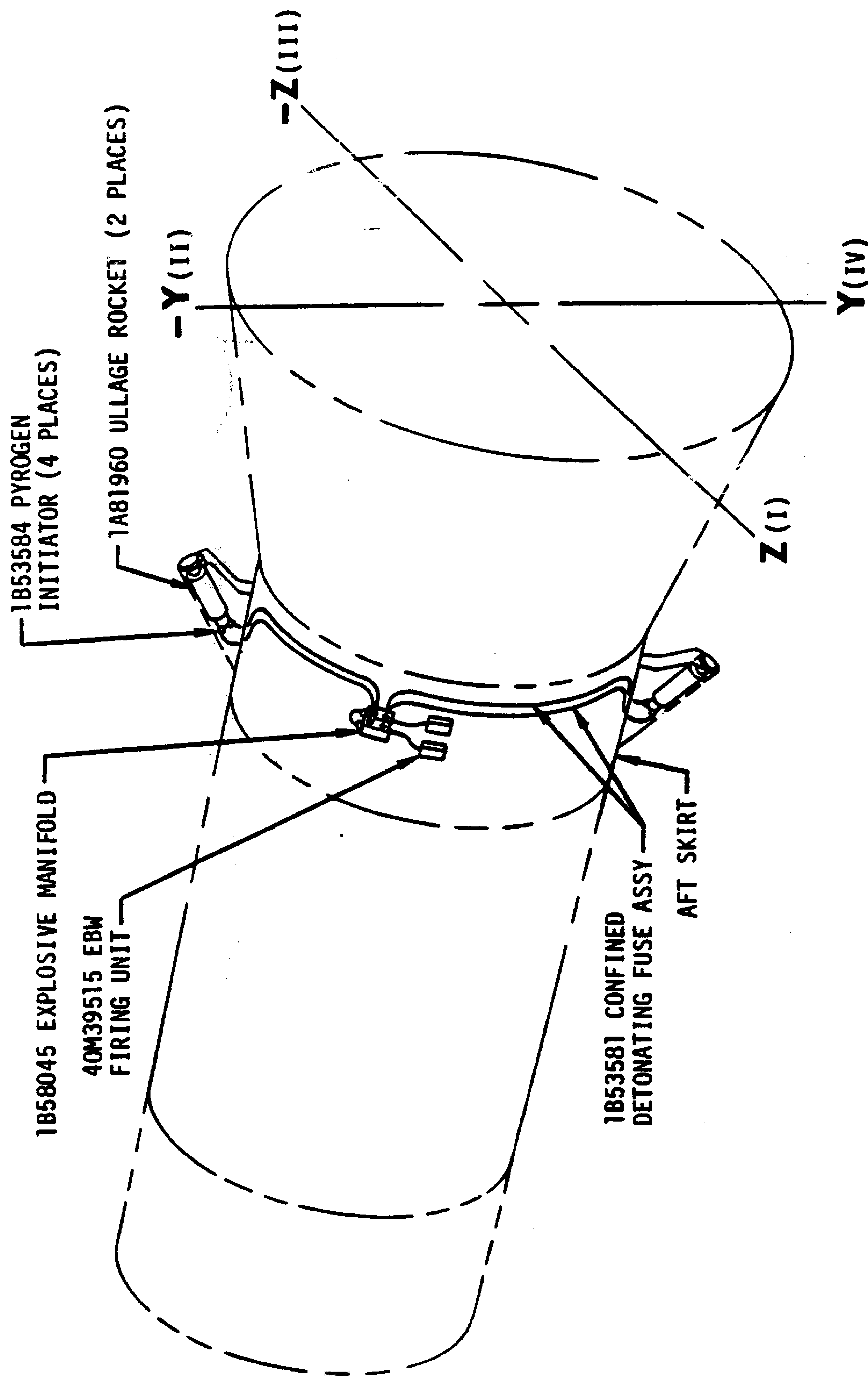


**RETROCKET IGNITION SYSTEM (1B55323)**



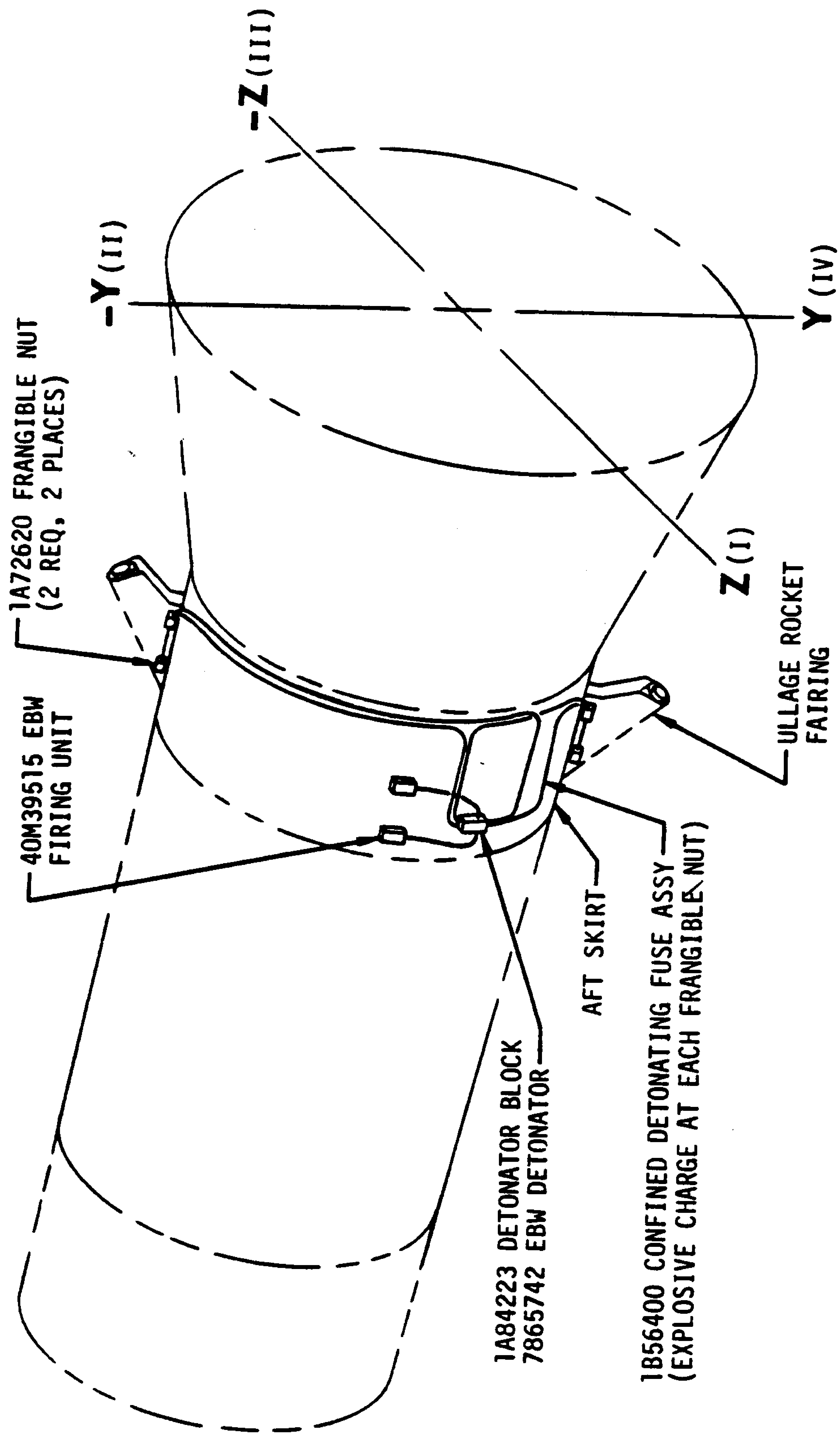






ULLAGE ROCKET IGNITION SYSTEM (1B57448)

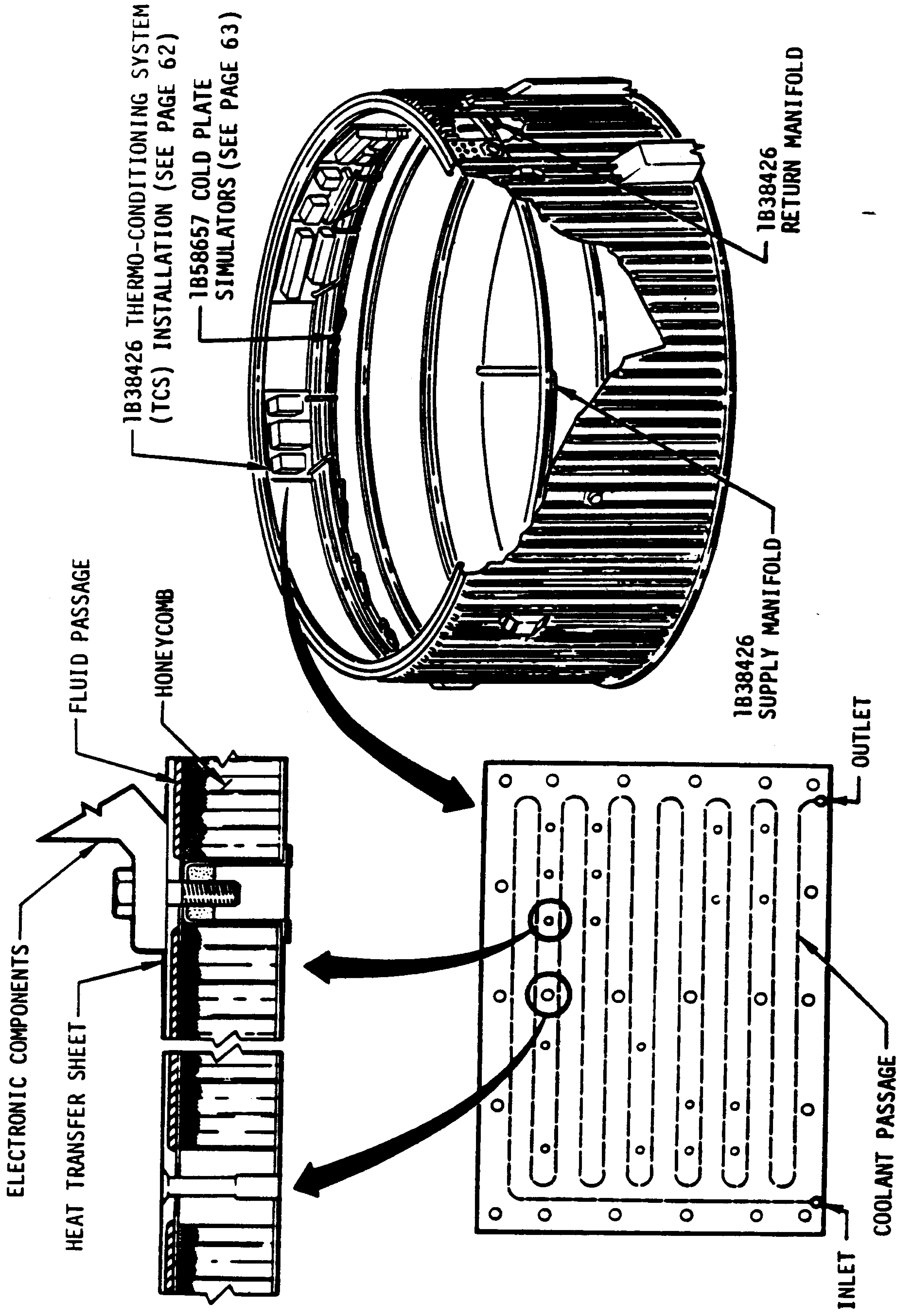






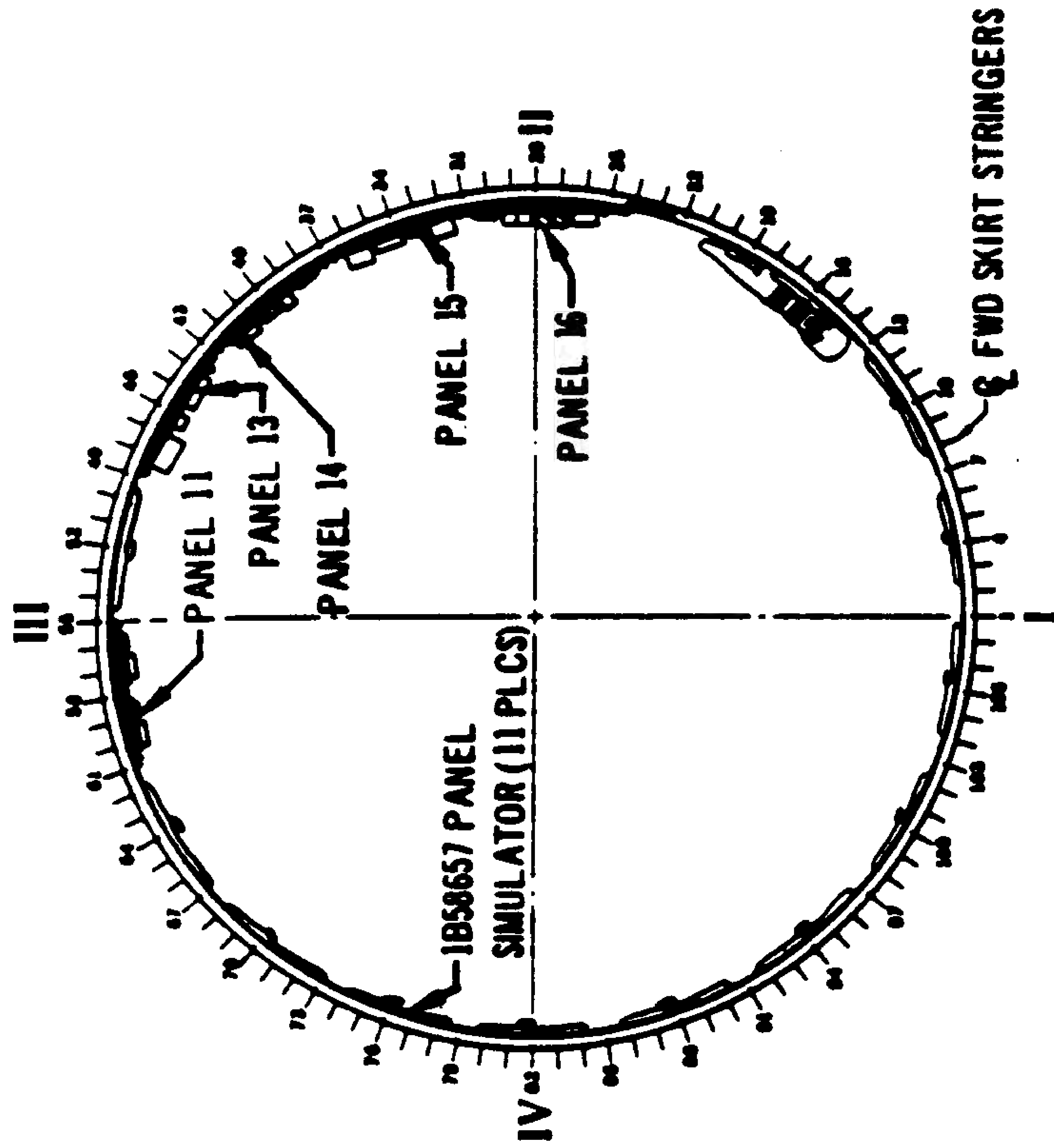
**SECTION 4**  
**ENVIRONMENTAL**  
**CONTROL**



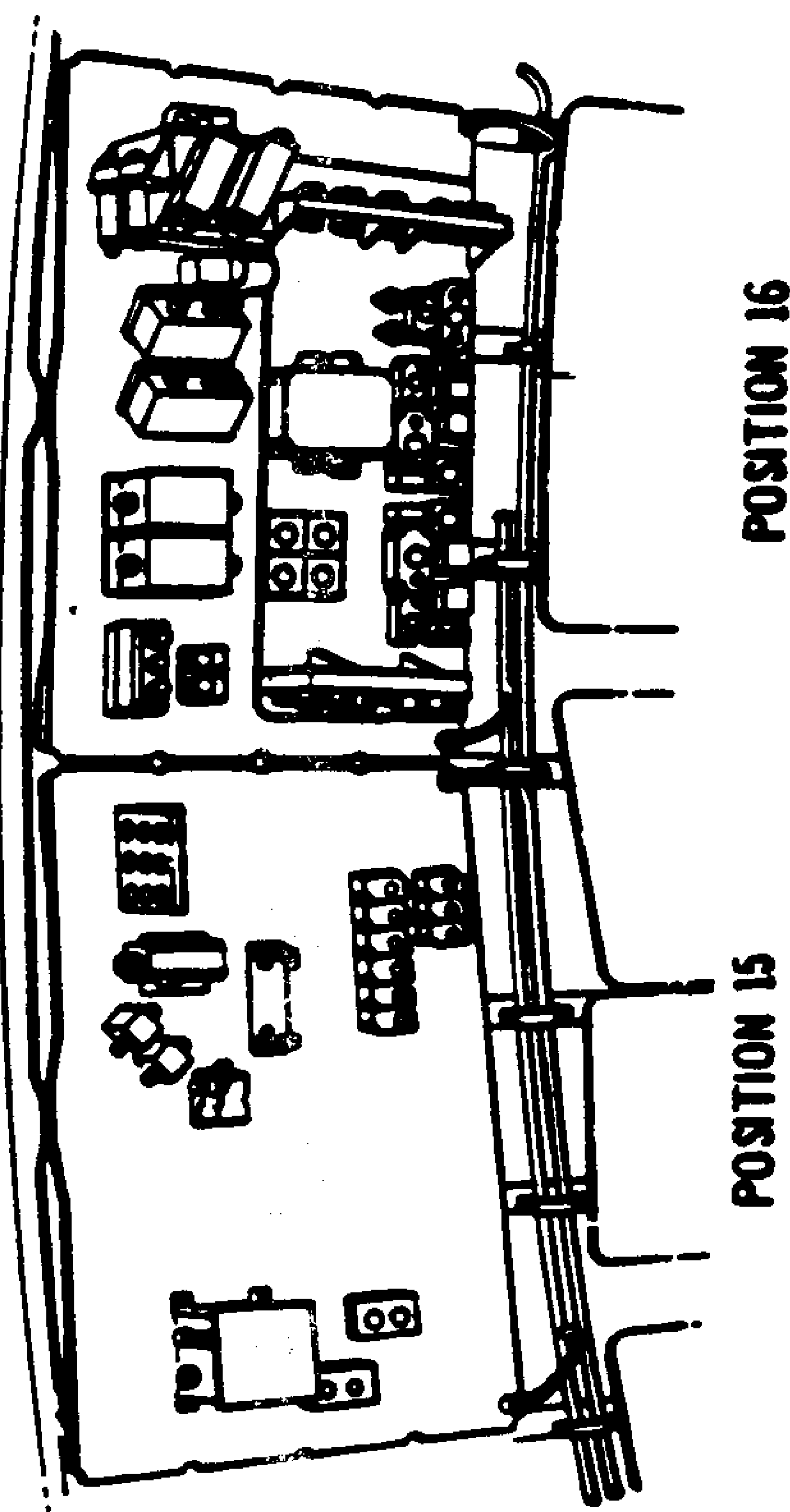
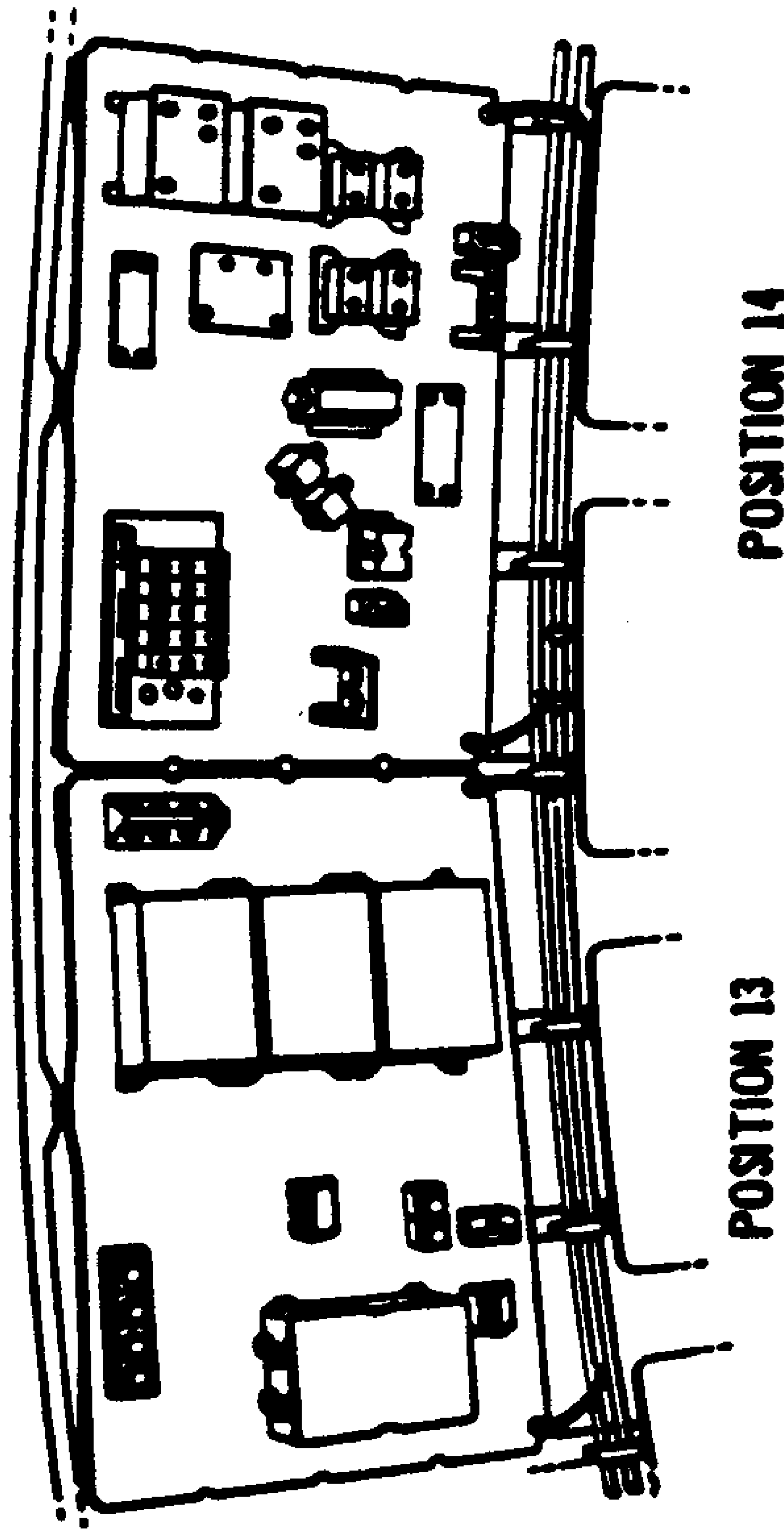
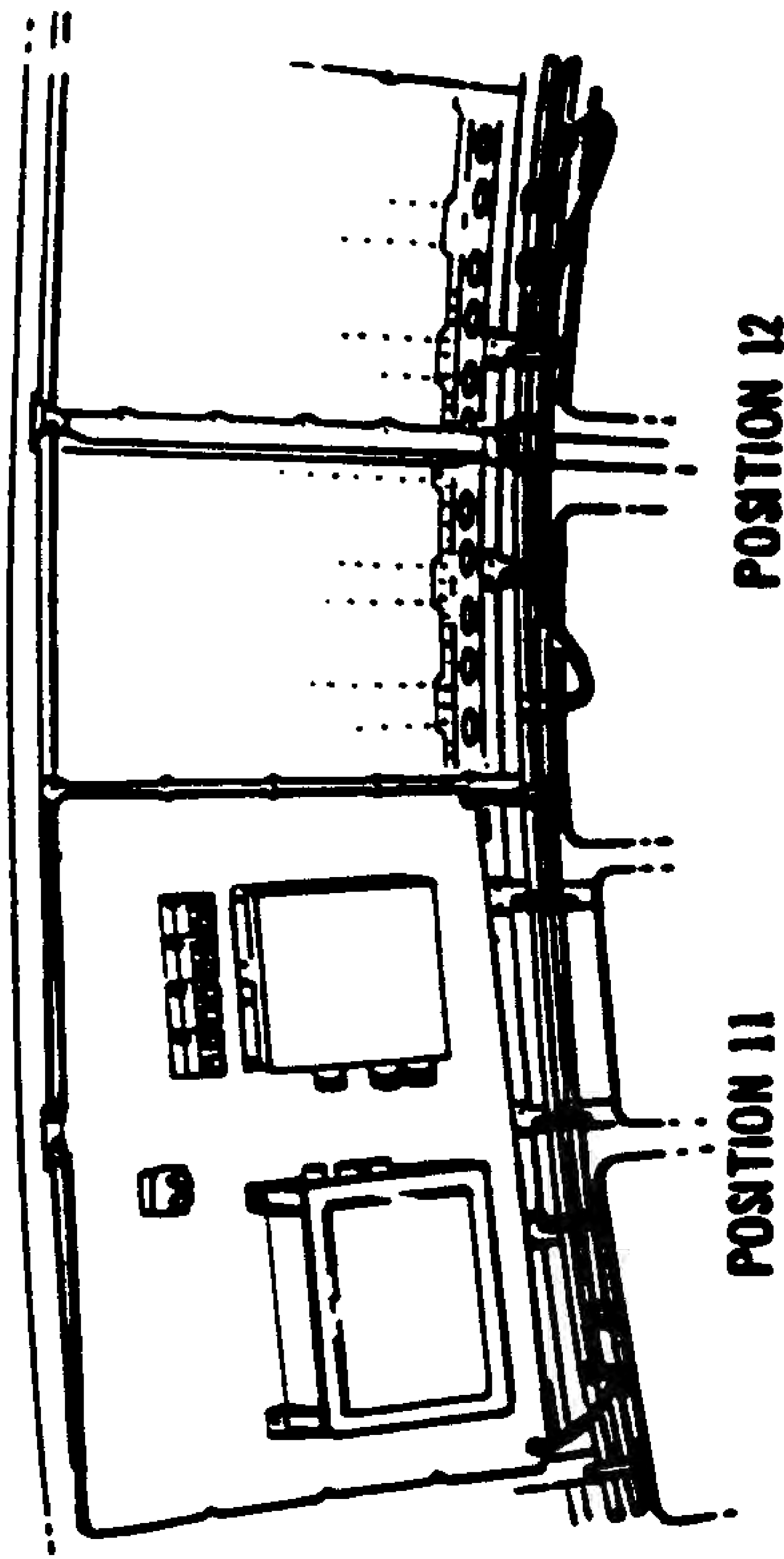
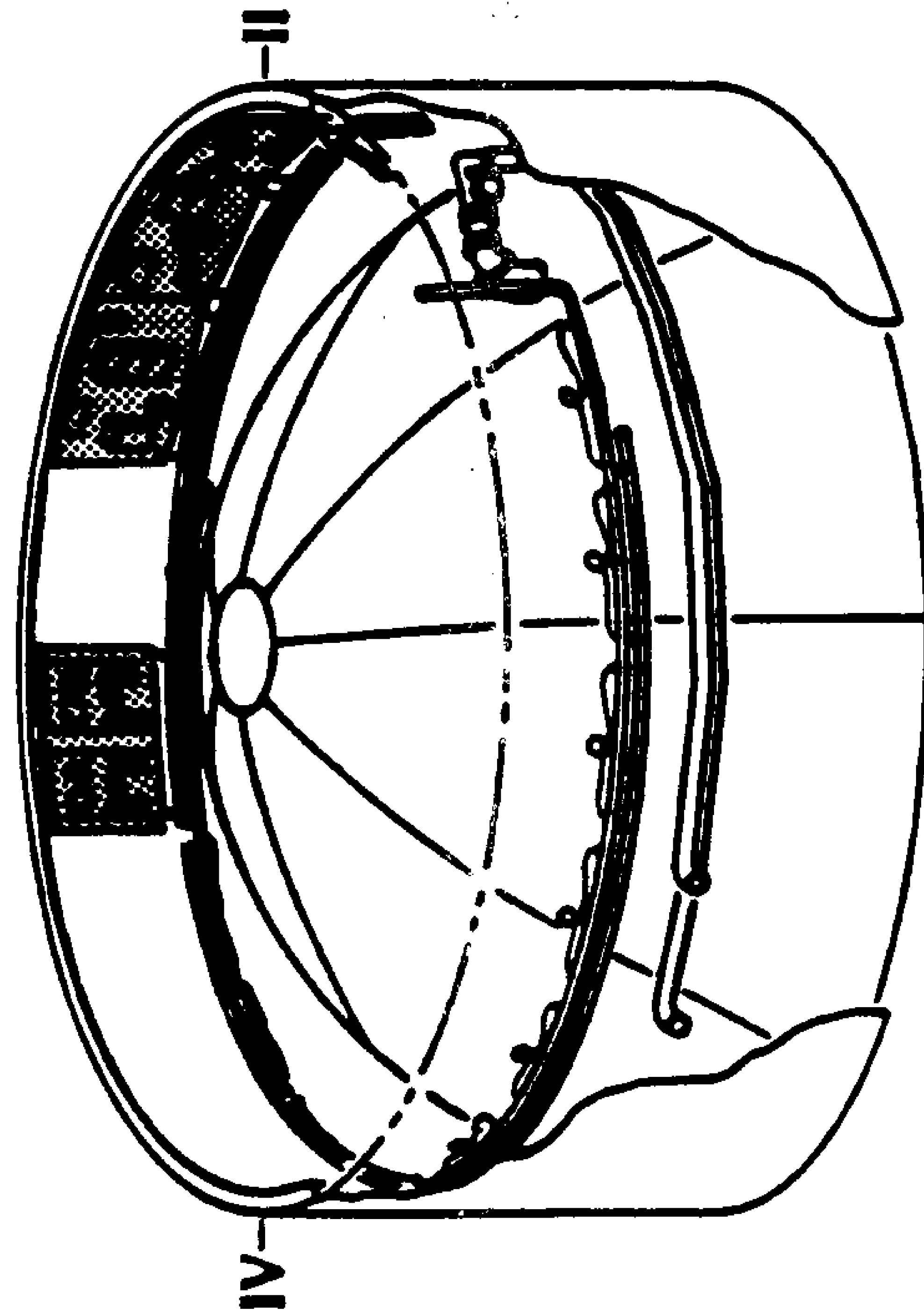


TCS PANEL DETAIL (TYPICAL)

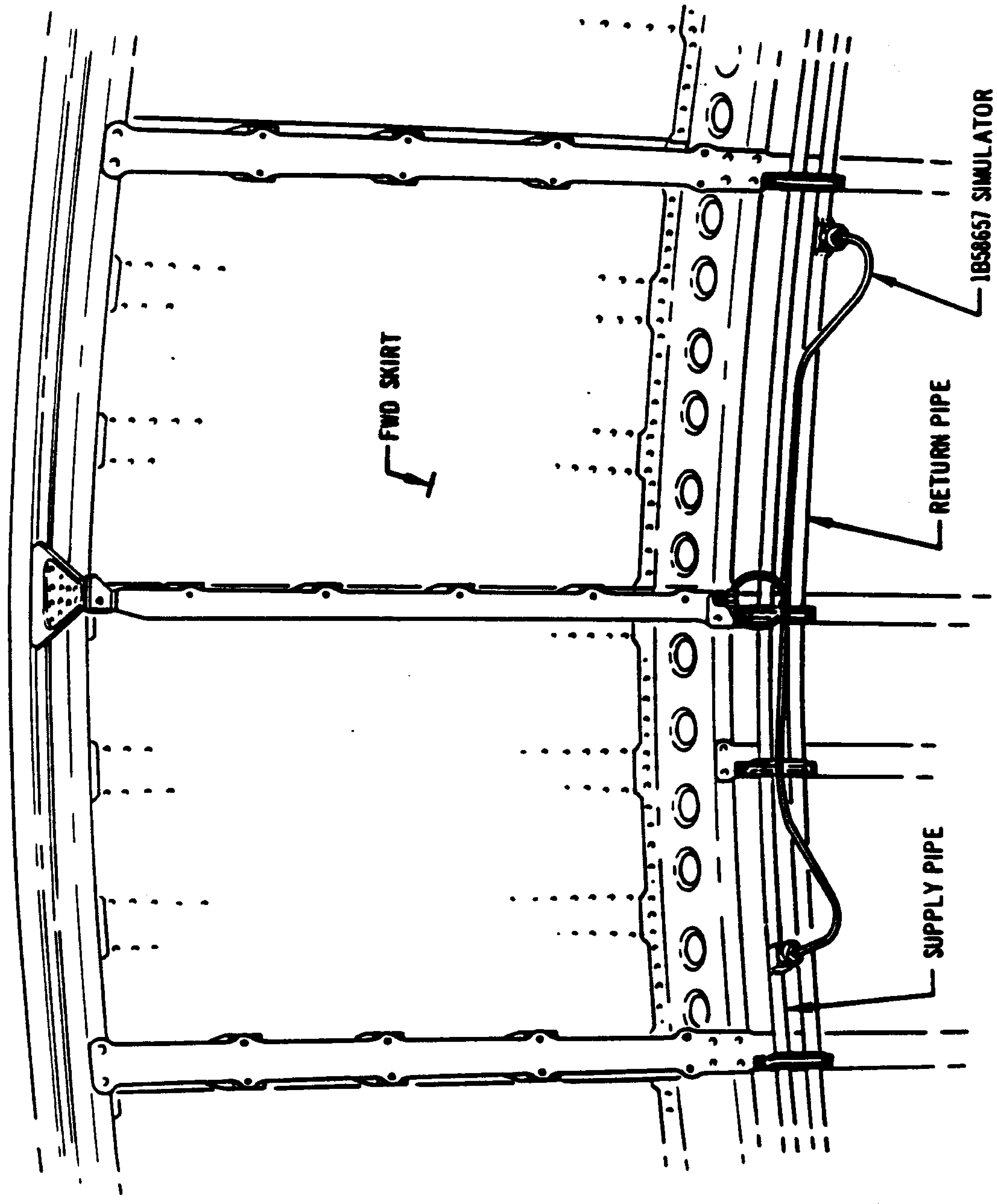




NOTE:  
 507 & 508 ALSO USE  
 POSITION 12.  
 1008 & 1010 ALSO  
 USE POSITIONS 7,  
 8 & 12.



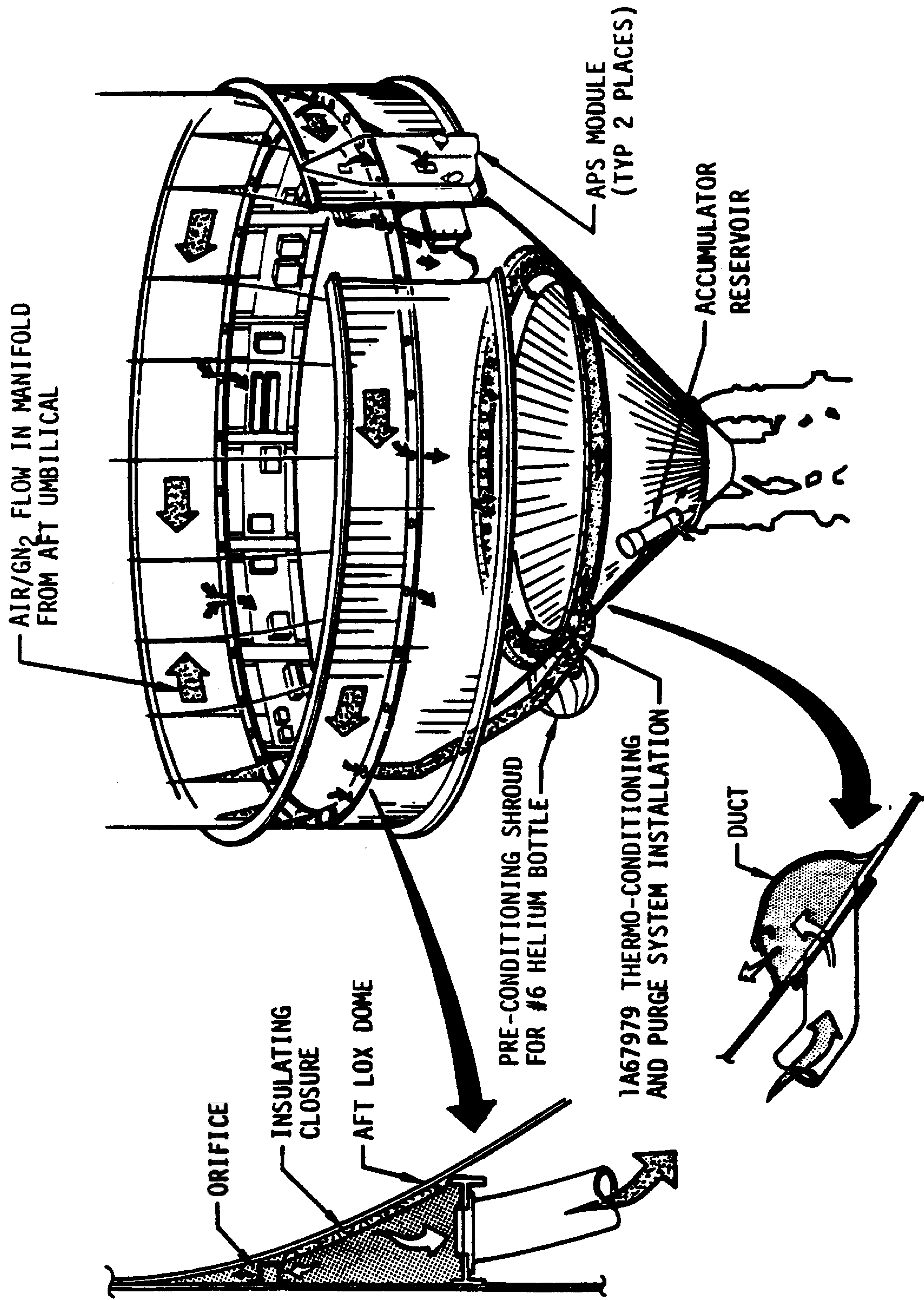




NOTE:  
 TYPICAL FOR POSITIONS WITHOUT  
 THERMO - CONDITIONING PANELS

PANEL SIMULATOR PIPE ASSEMBLY (1B58657)



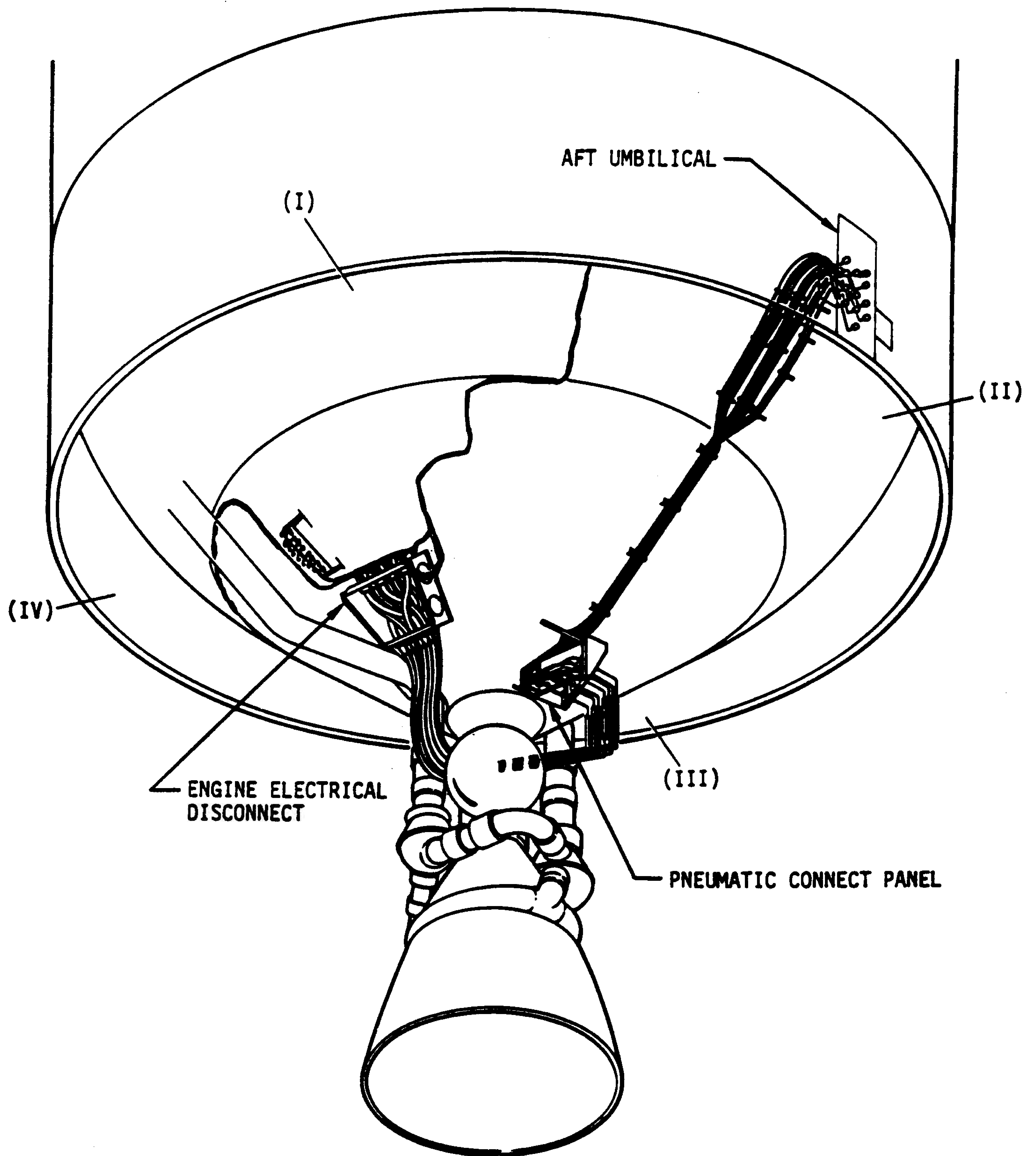


AFT ENVIRONMENTAL CONTROL SYSTEM



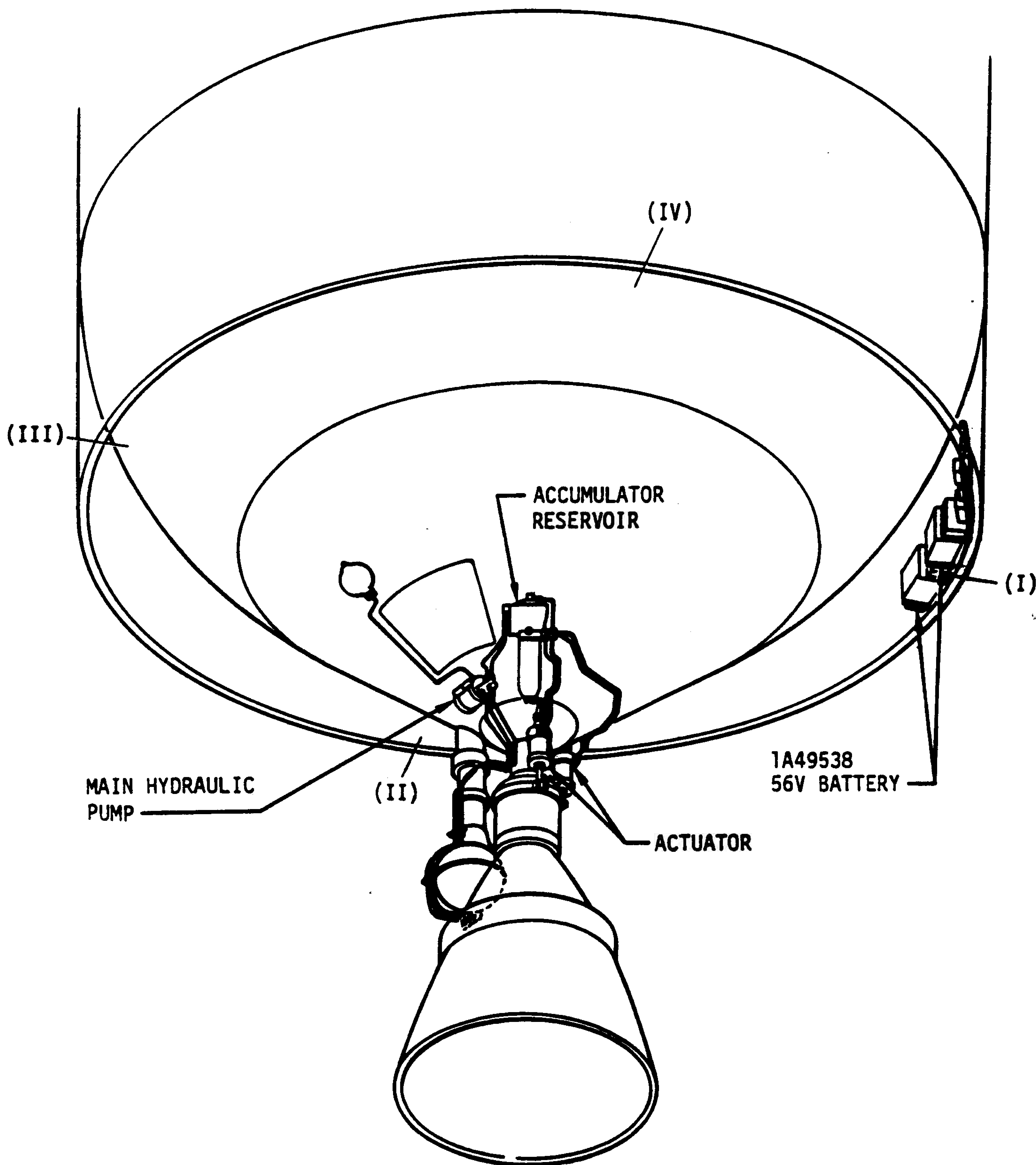
**SECTION 5**  
**ELECTRICAL**





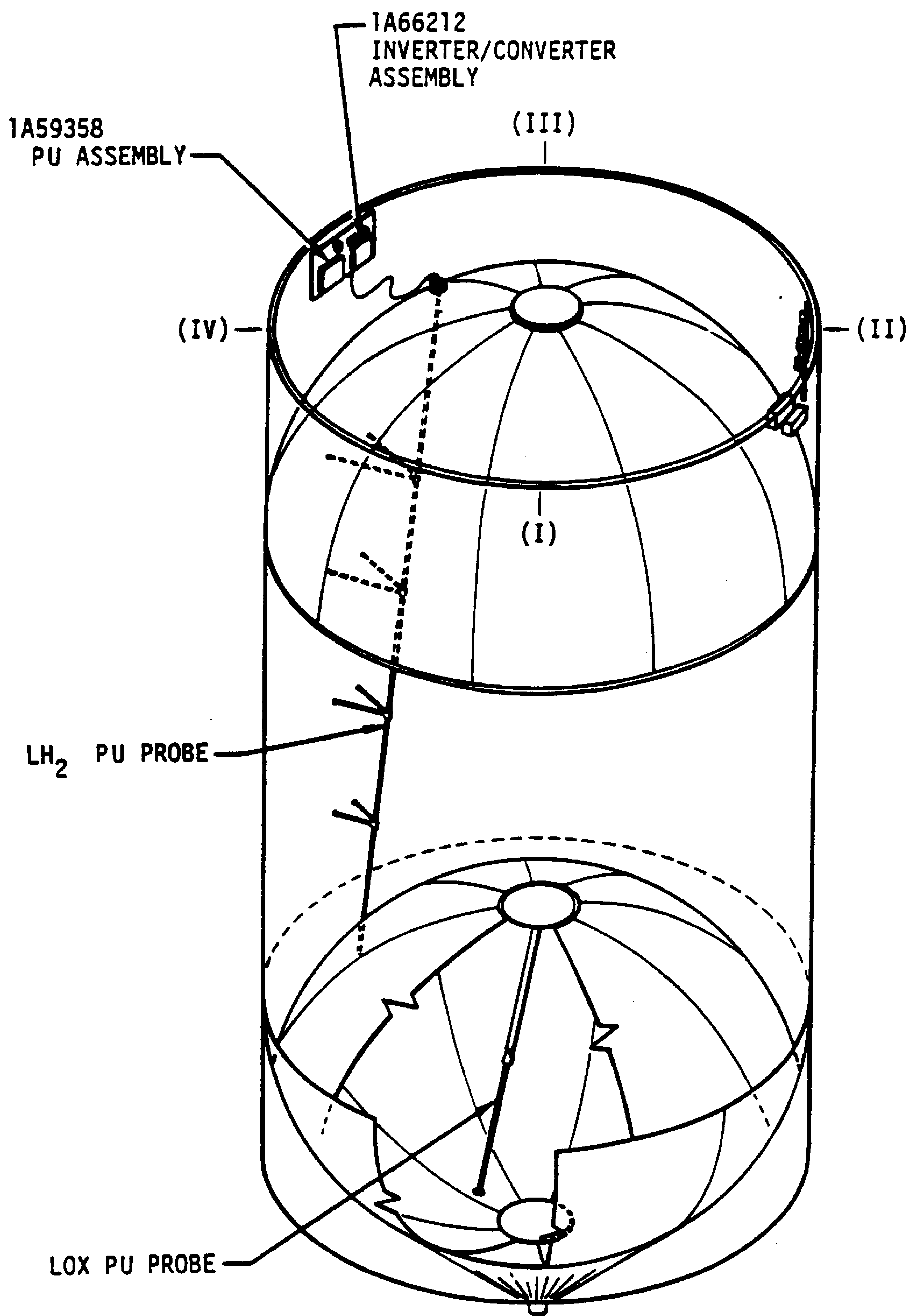
PNEUMATIC LINES AND WIRING TO J2 ENGINE





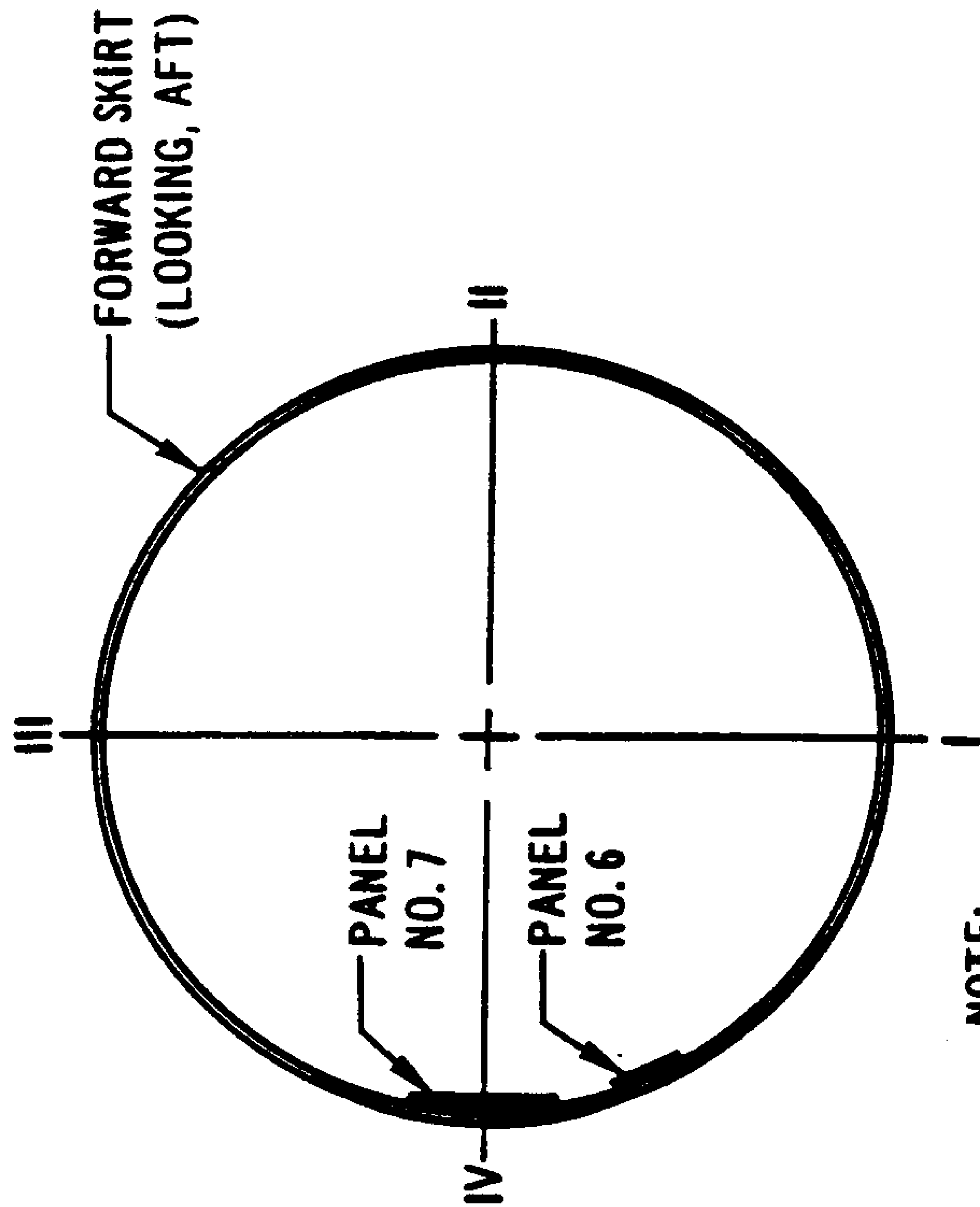
ENGINE GIMBAL SYSTEM



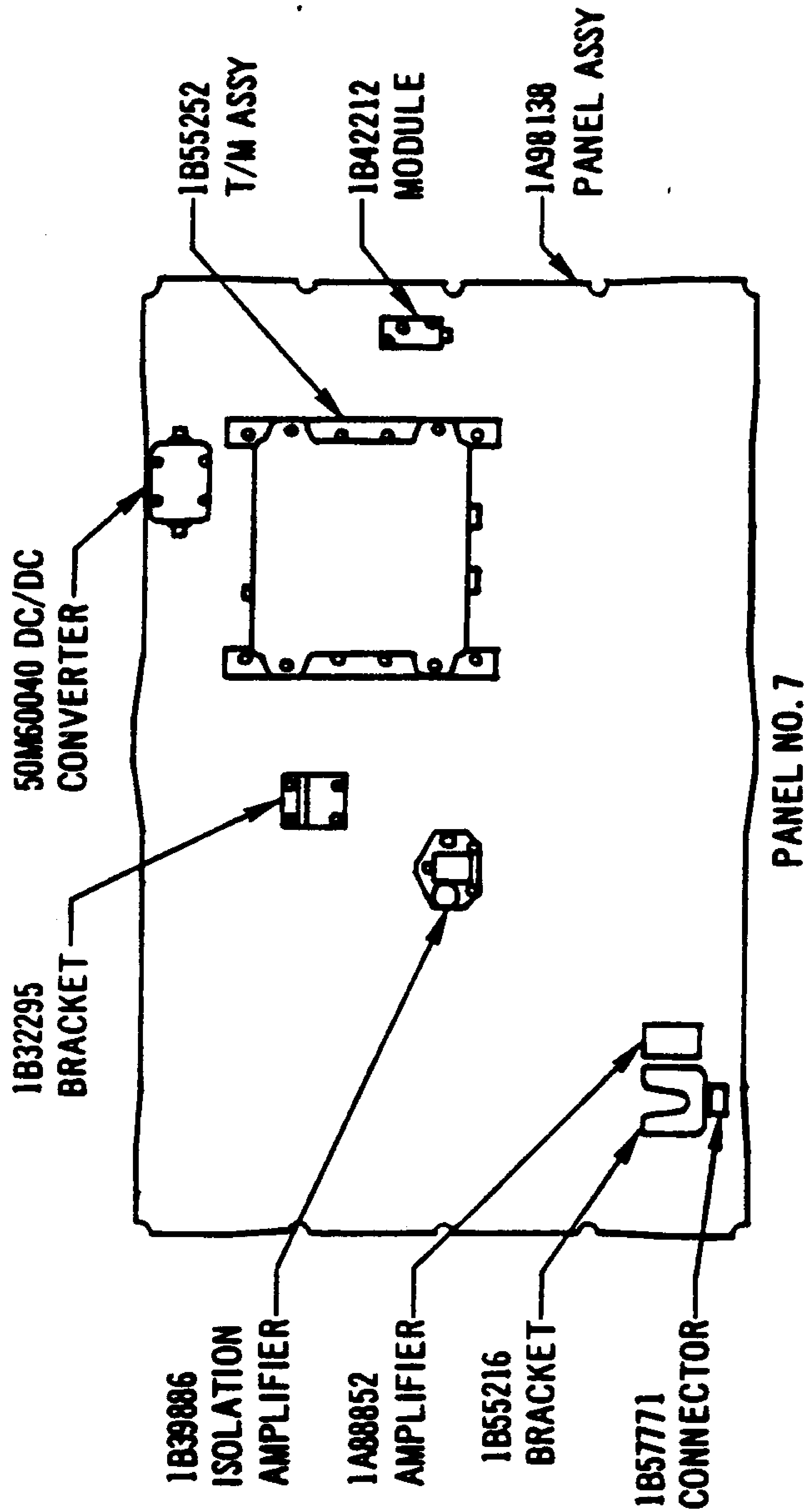
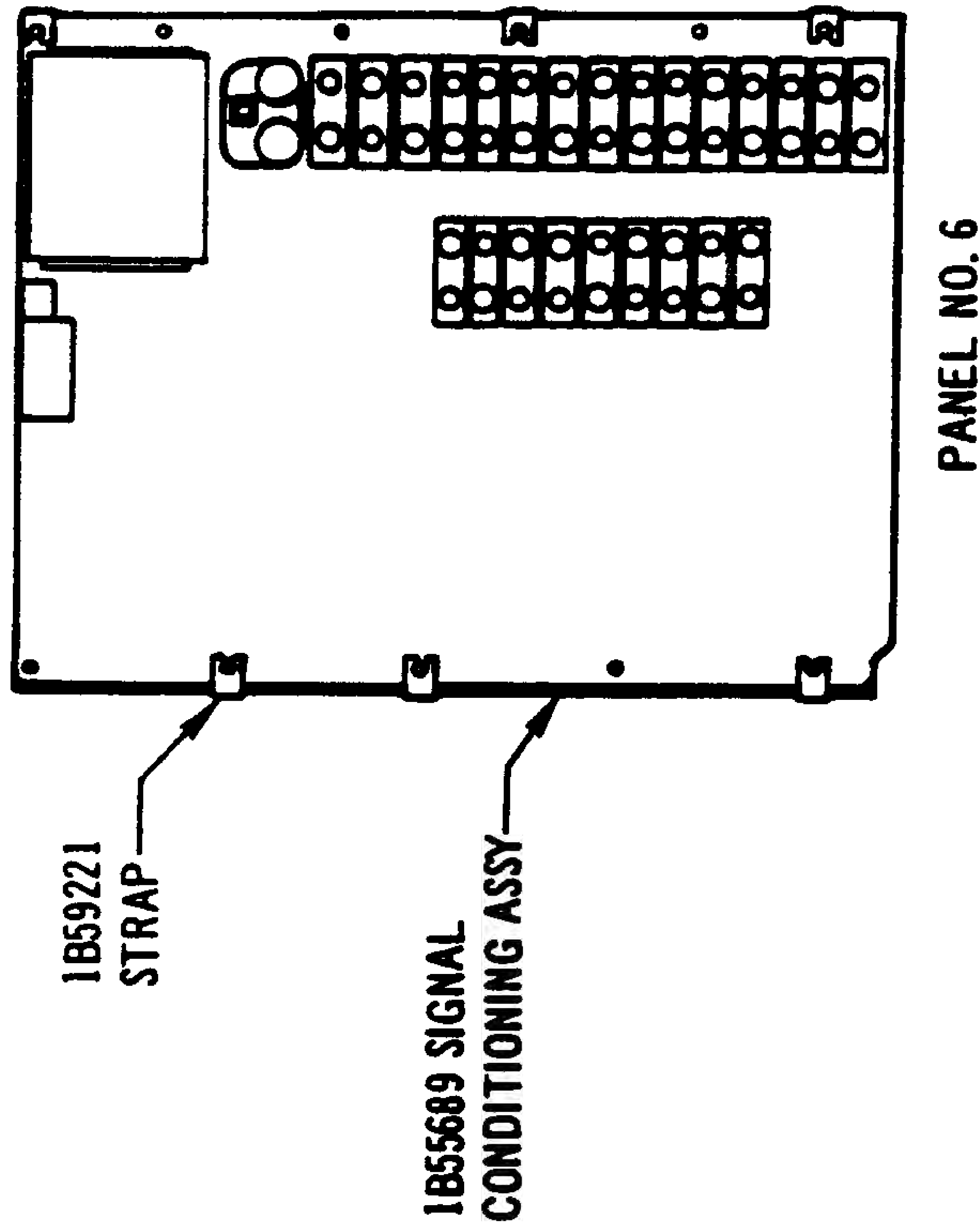


PROPELLANT UTILIZATION INVERTERS



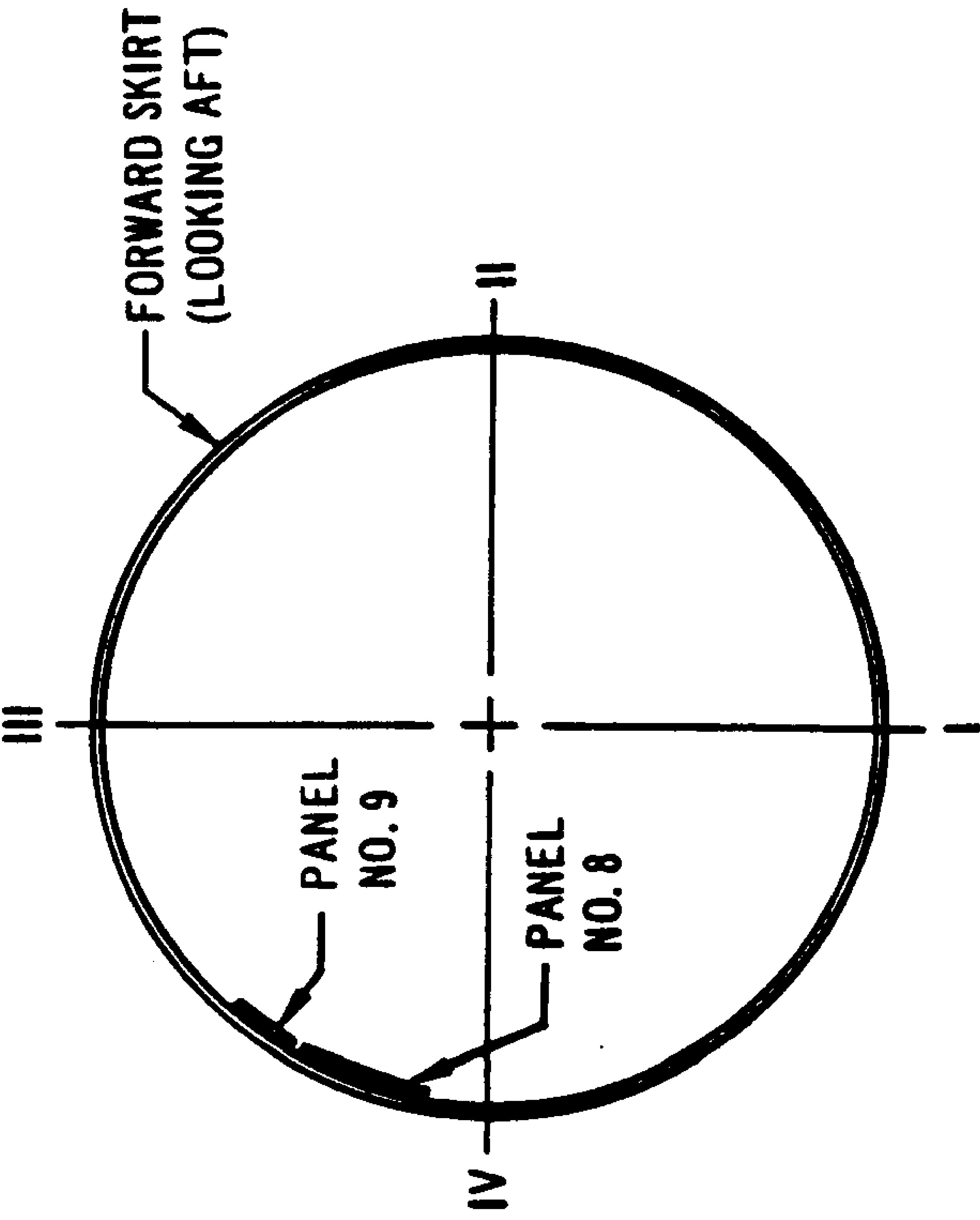


NOTE:  
REFERENCE INSTALLATION  
DWGS 1B55394 & 1B57997.

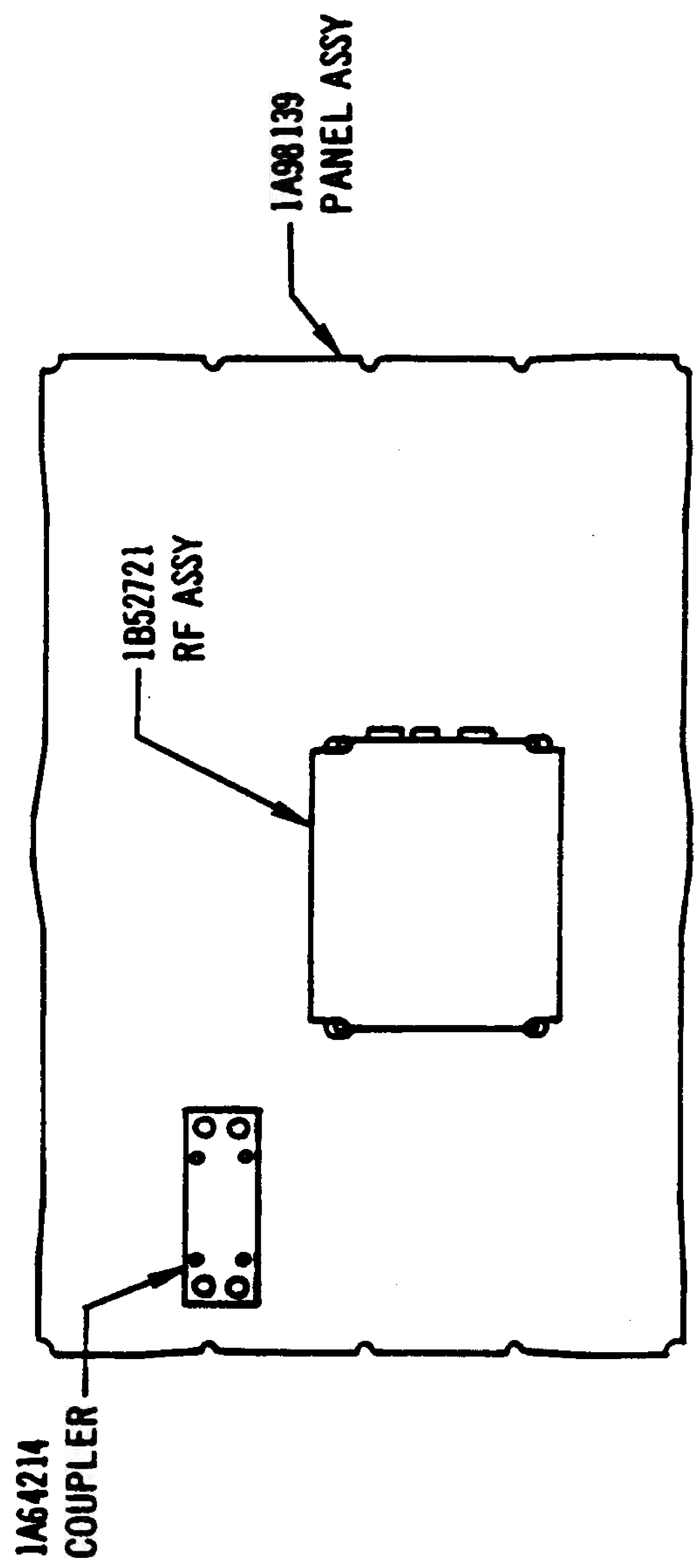
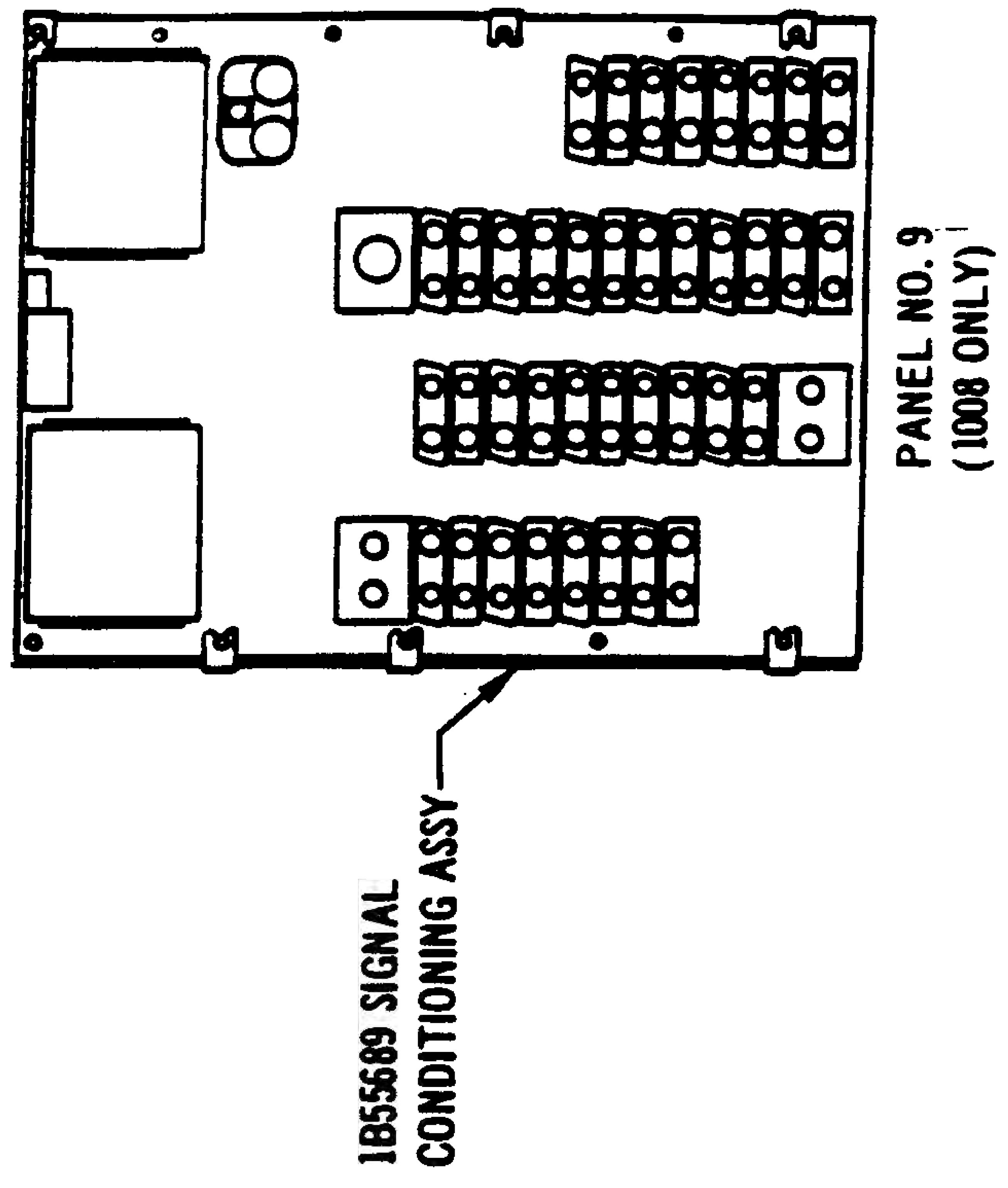


FORWARD SKIRT - PANEL NO. 6 AND 7 (1008, 1010)



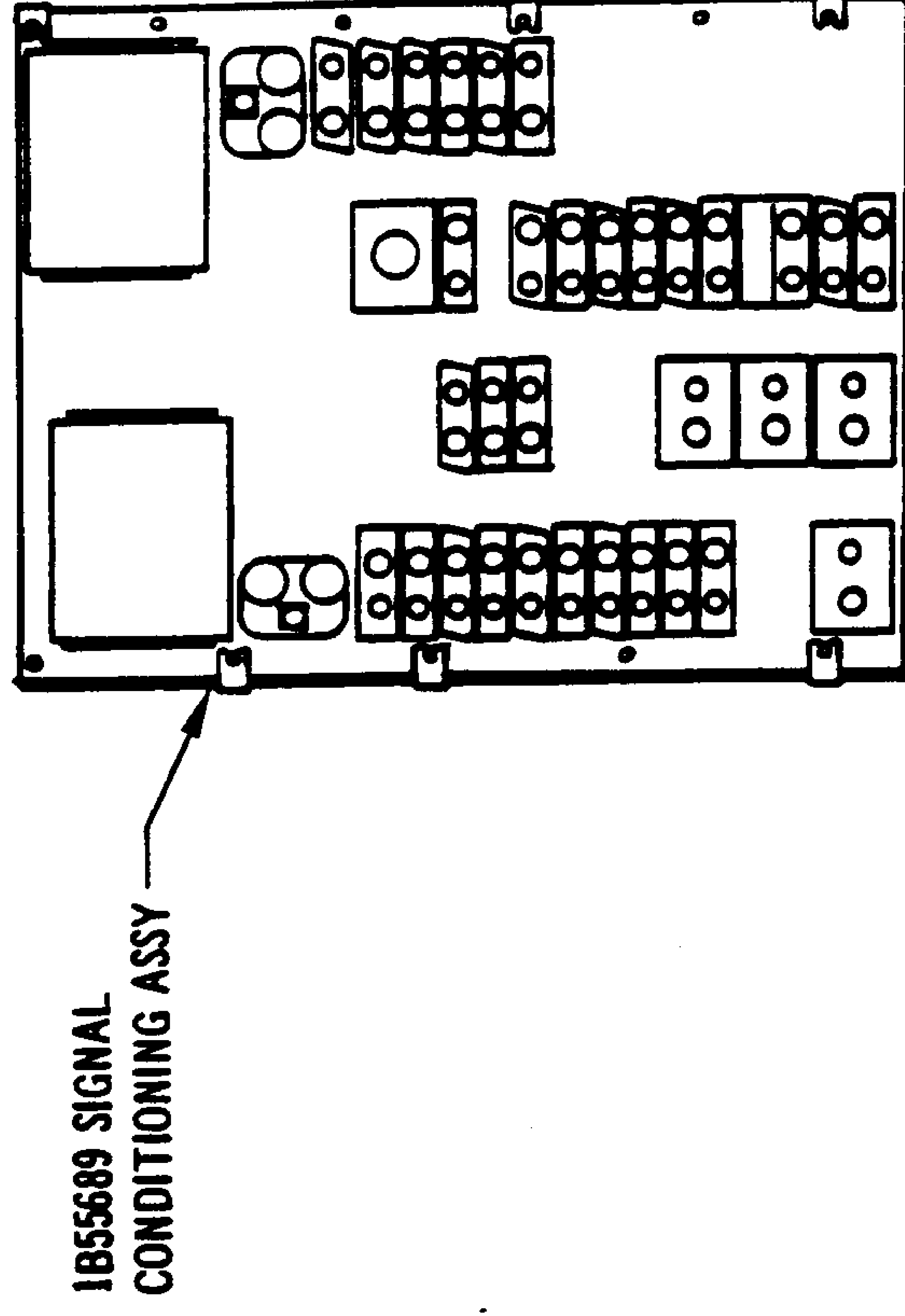
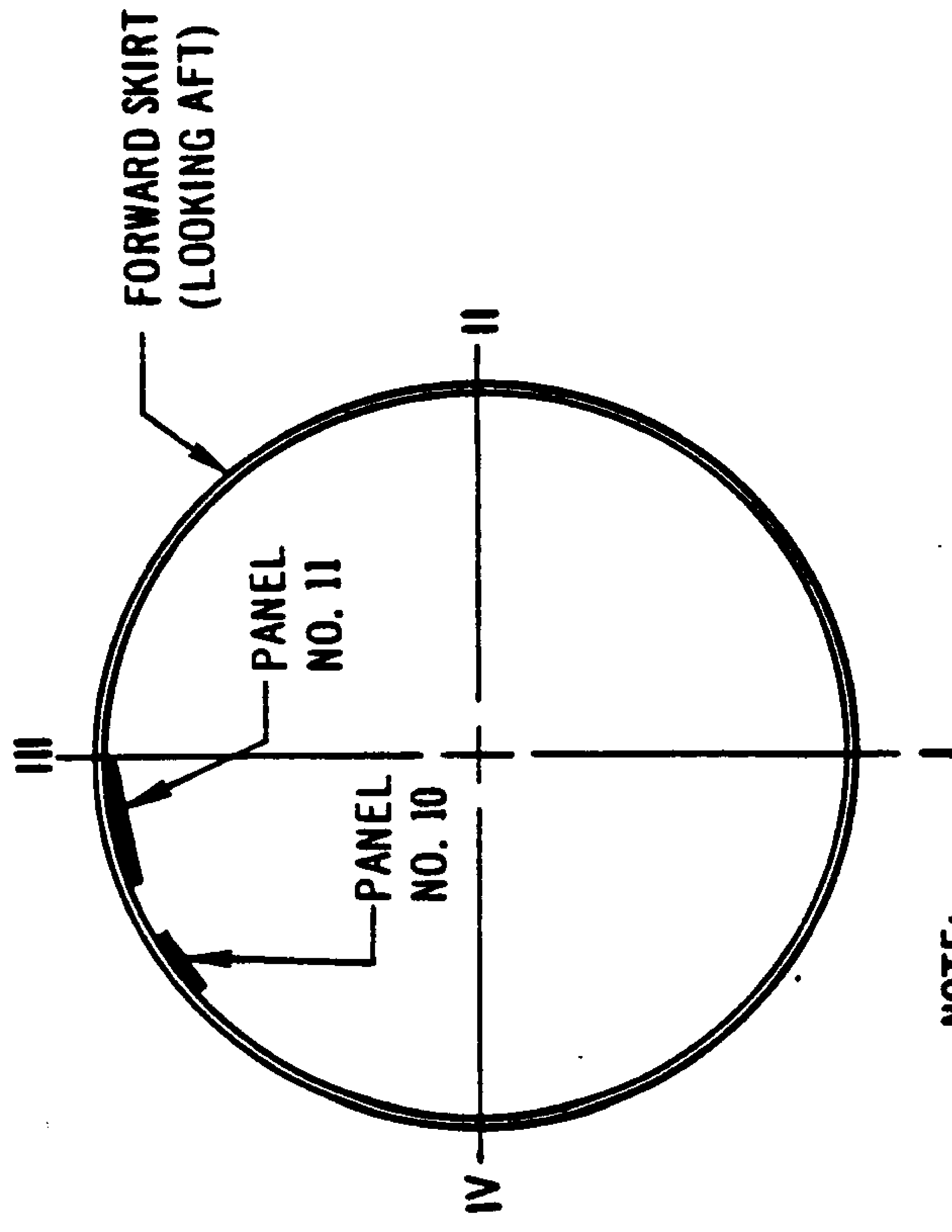


NOTE:  
REFERENCE INSTALLATION  
DWGS 1B55394 & 1B57997.

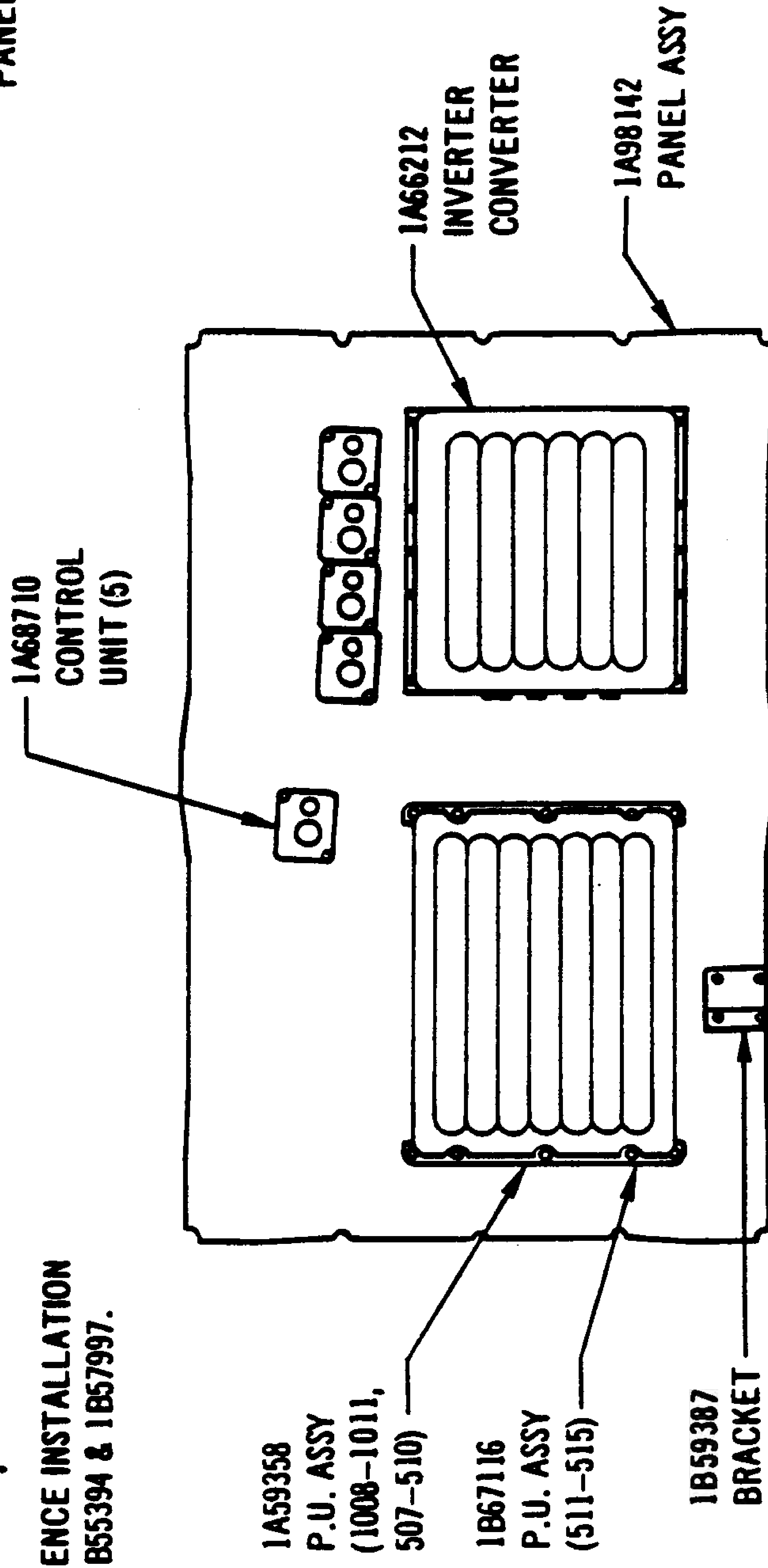


PANEL NO. 8

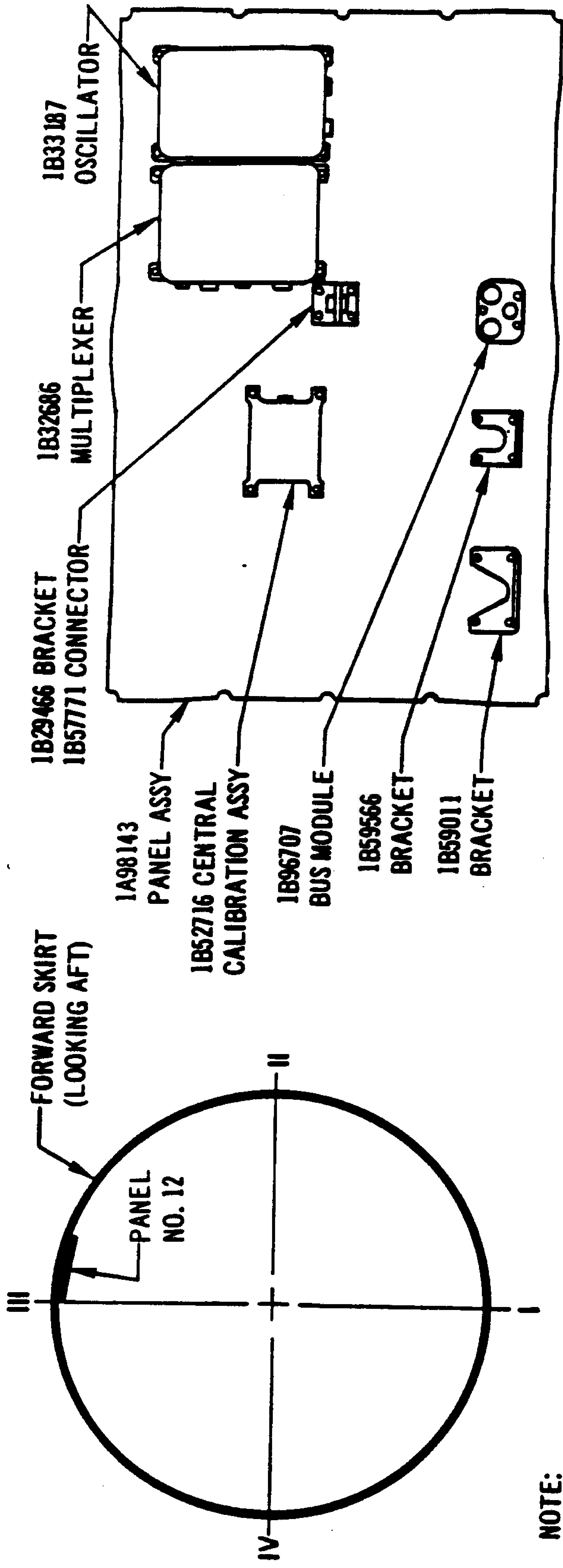




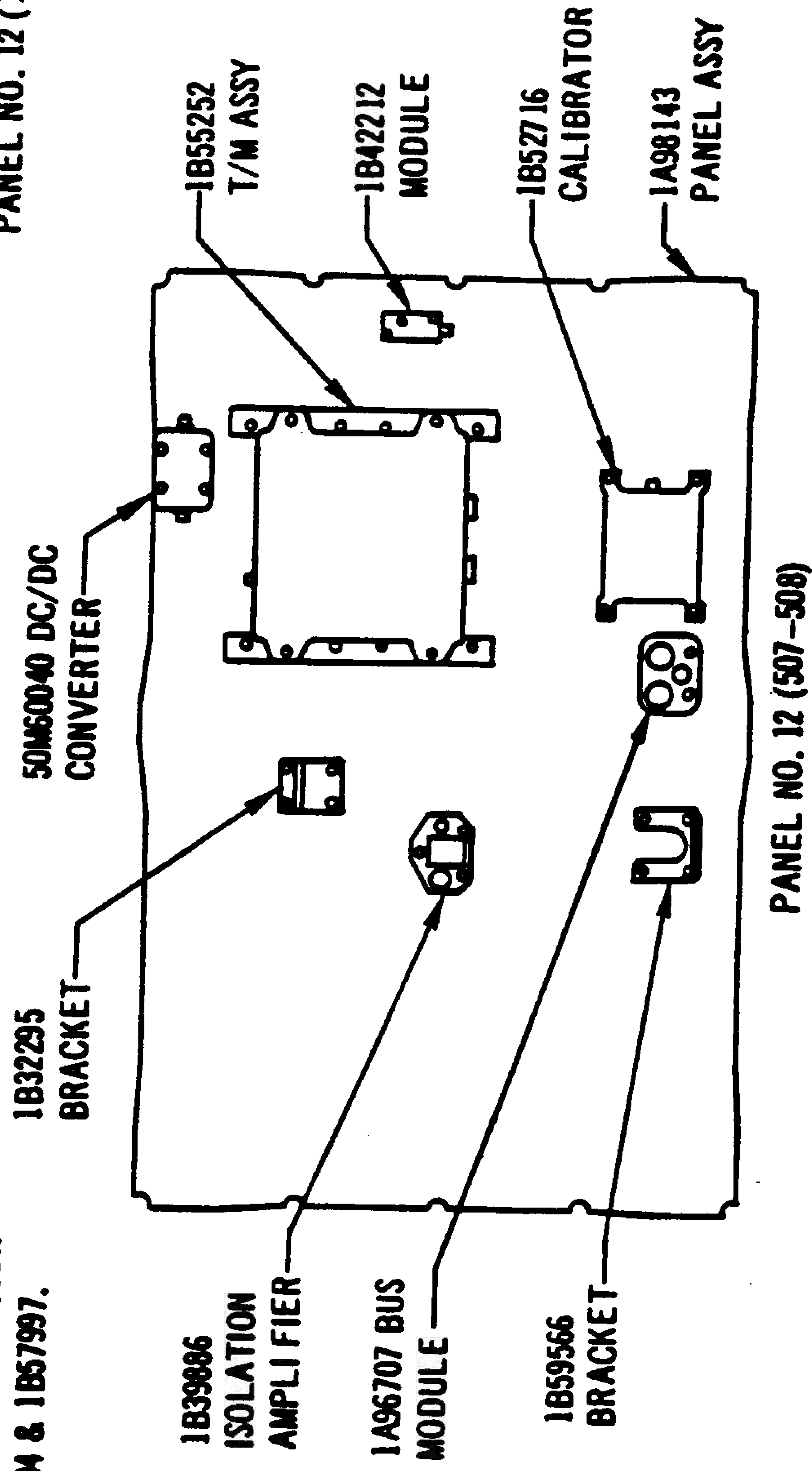
NOTE:  
REFERENCE INSTALLATION  
DWGS 1B55394 & 1B57997.



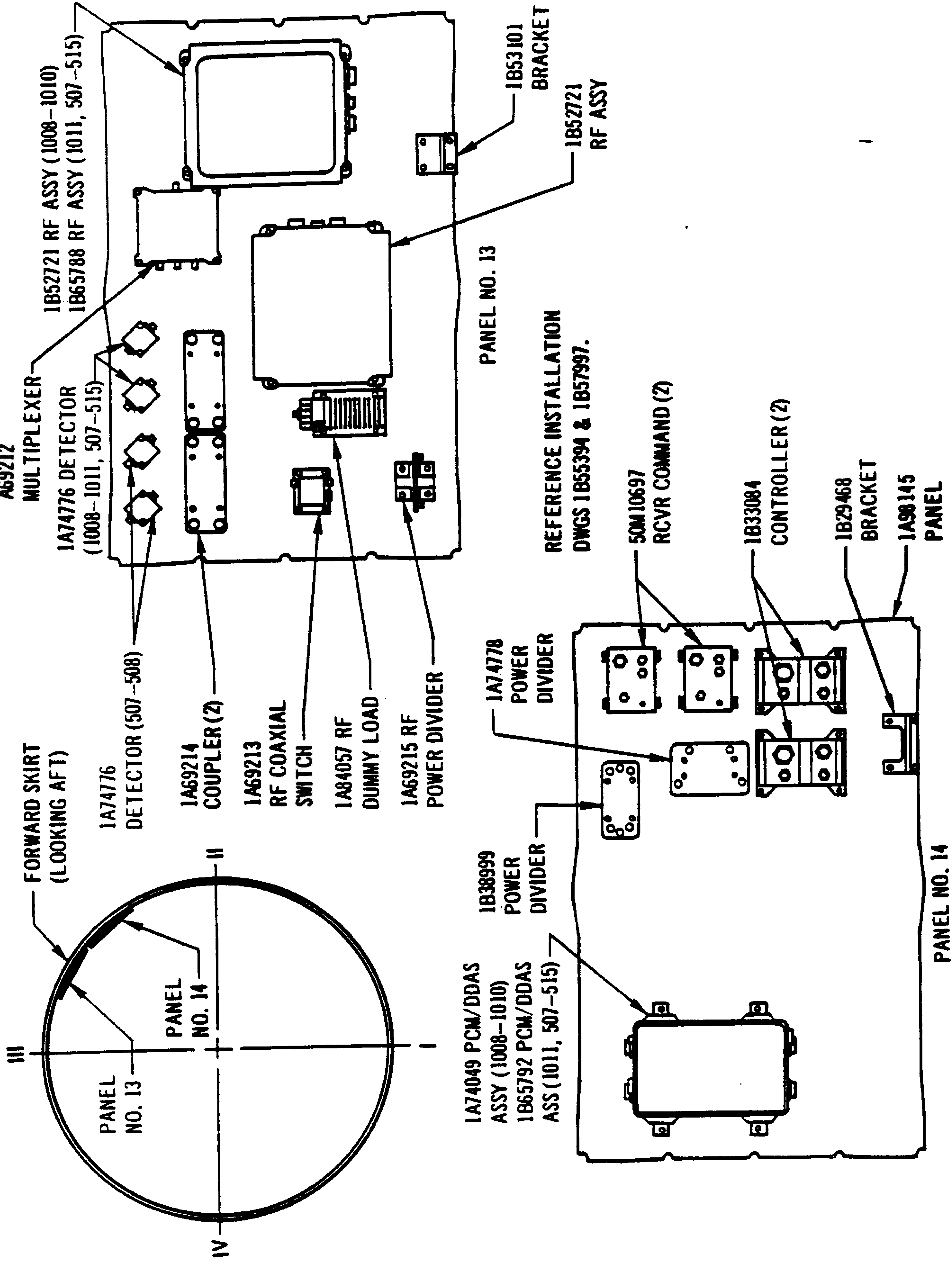




PANEL NO. 12 (1008, 1010)

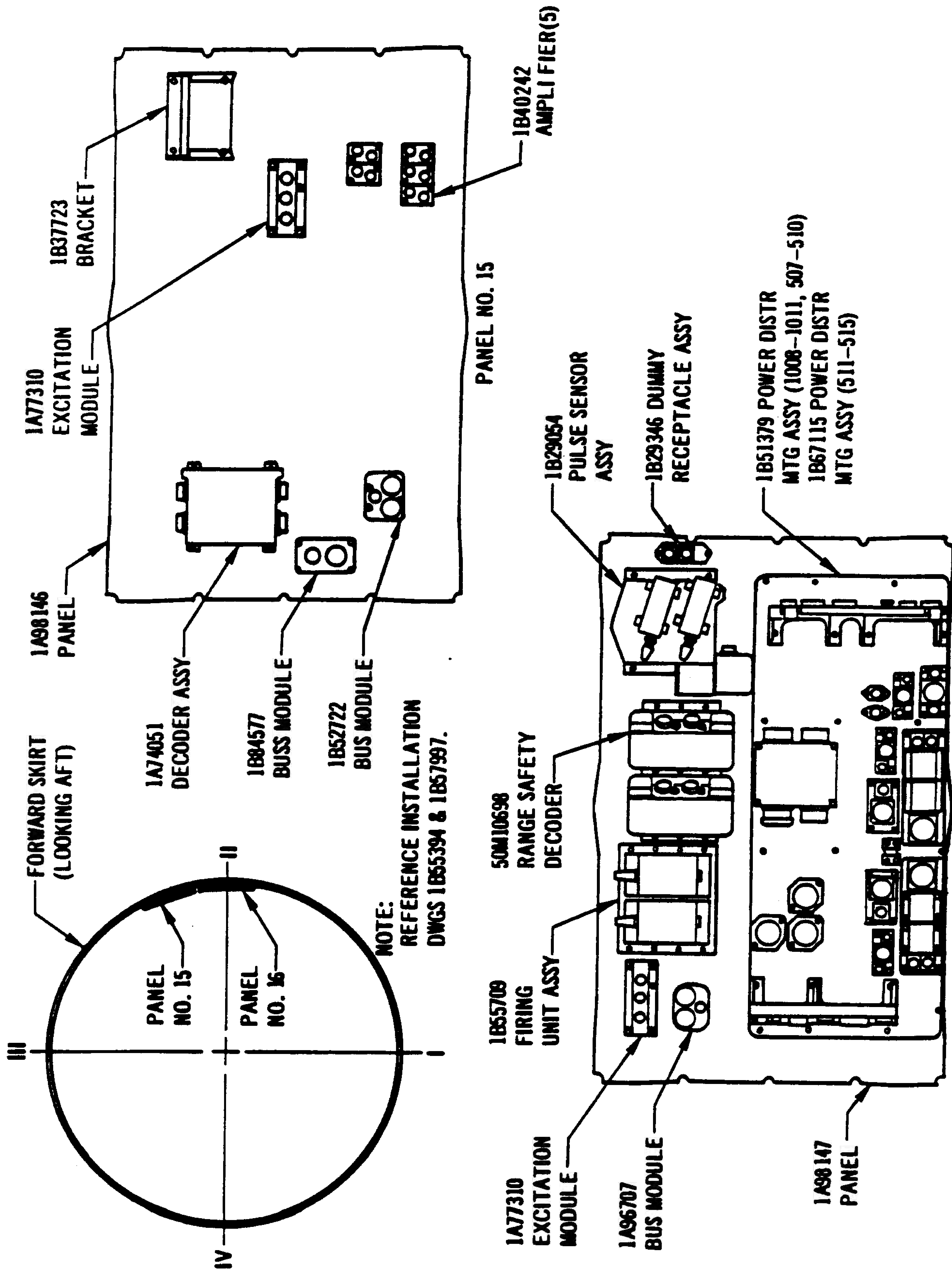






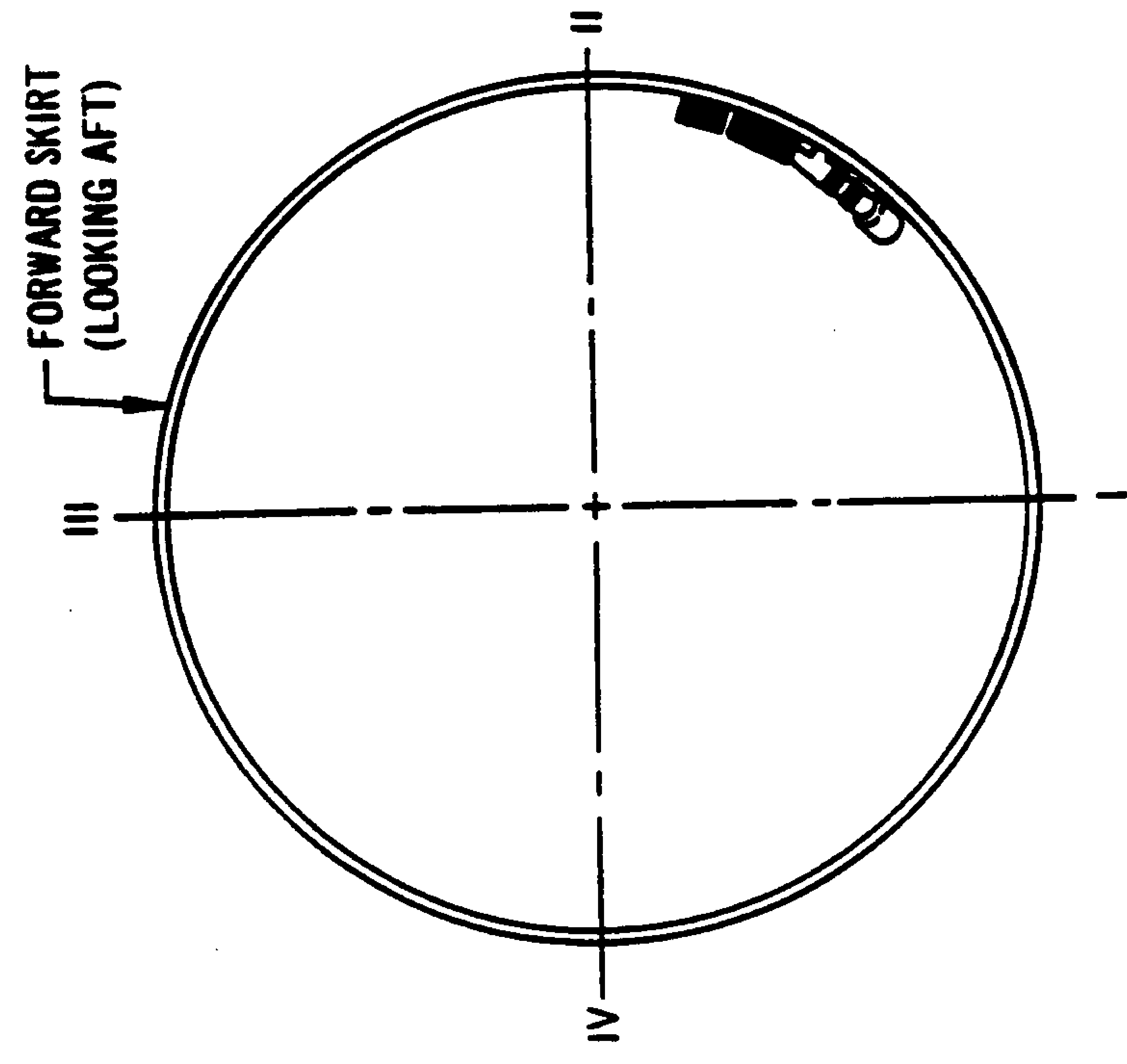
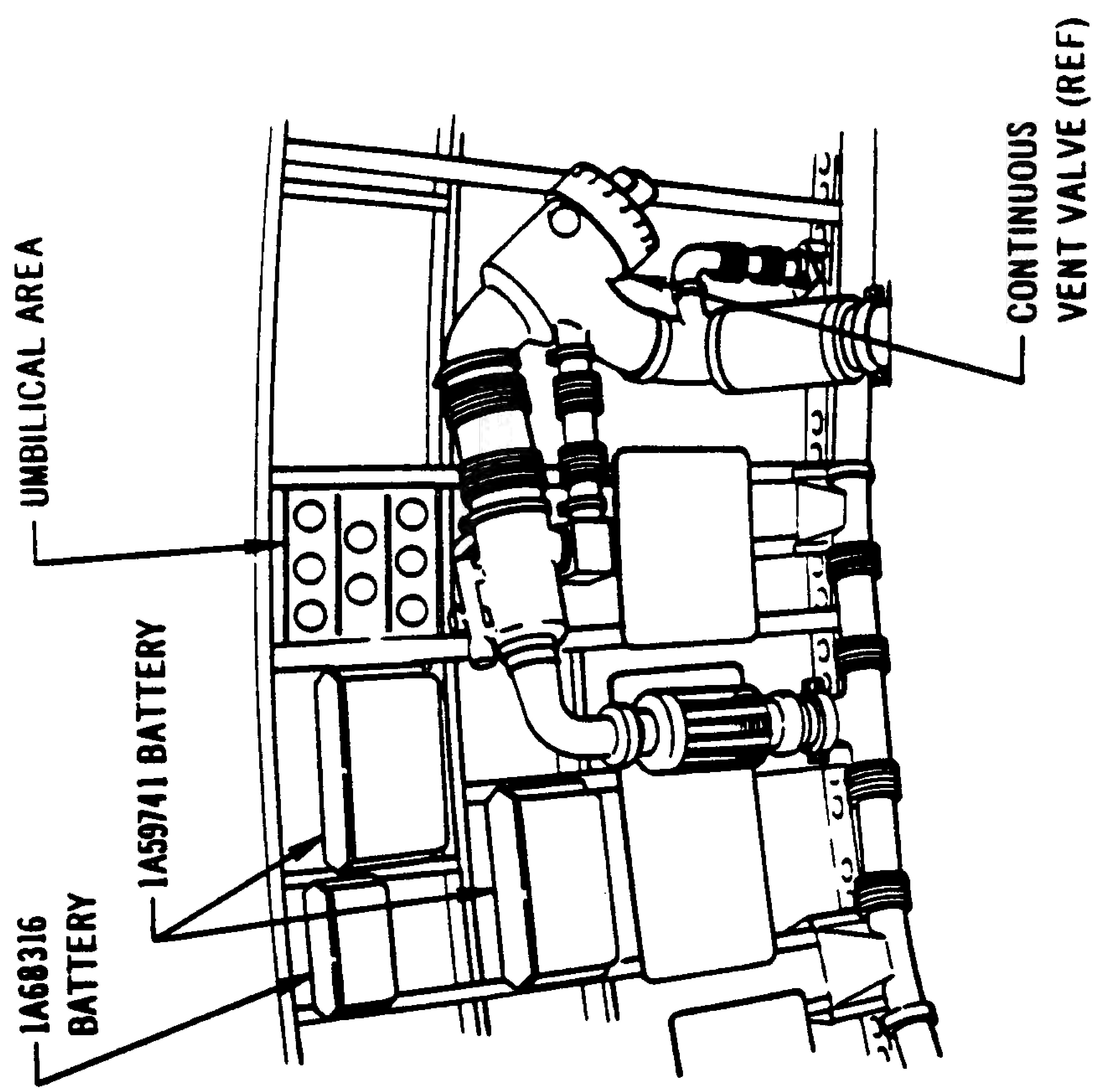
FORWARD SKIRT - PANEL POSITION 13 AND 14 (1008-1011, 507-515)





FORWARD SKIRT - PANEL POSITIONS 15 AND 16 (1008-1011, 507-515)





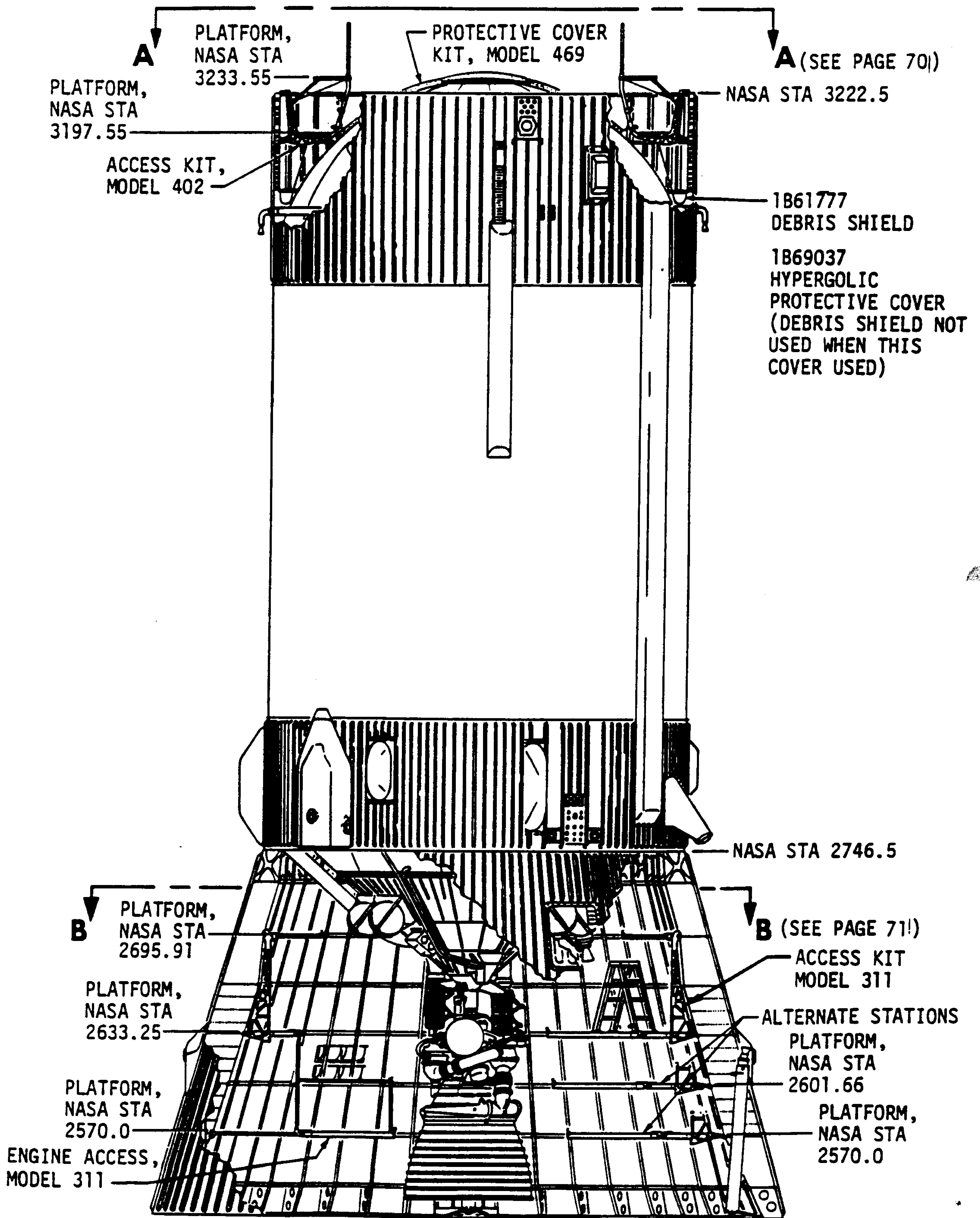
NOTE:  
REFERENCE INSTL  
DWG 1A49535.

# FORWARD SKIRT-VENT VALVE AREA (507 & SUBS)



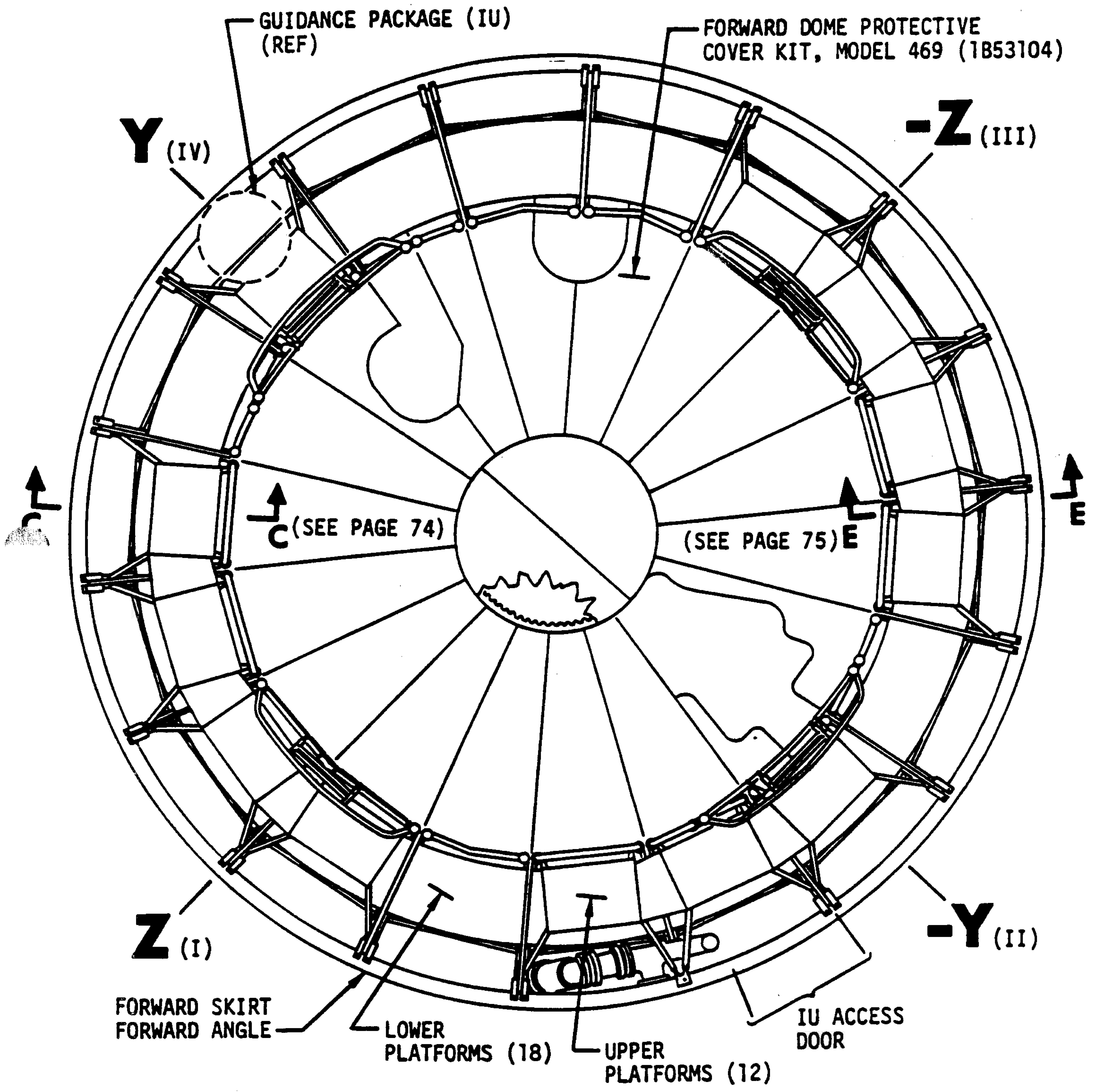
**SECTION 6**  
**STAGE SUPPORT**  
**EQUIPMENT**





FORWARD SKIRT AND AFT INTERSTAGE ACCESS KITS (VERTICAL POSITION)

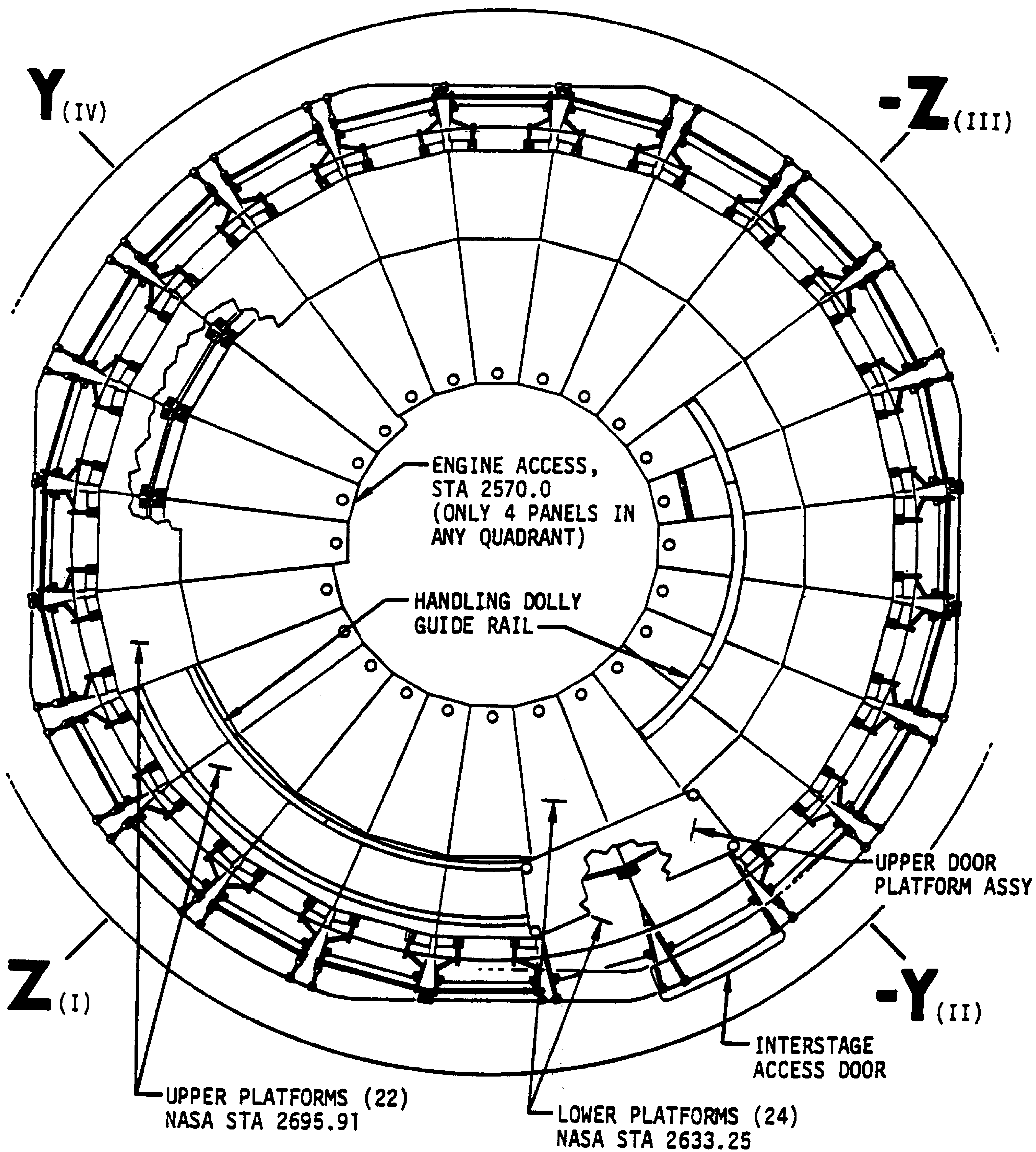




VIEW **A-A**  
(FROM PAGE 69)

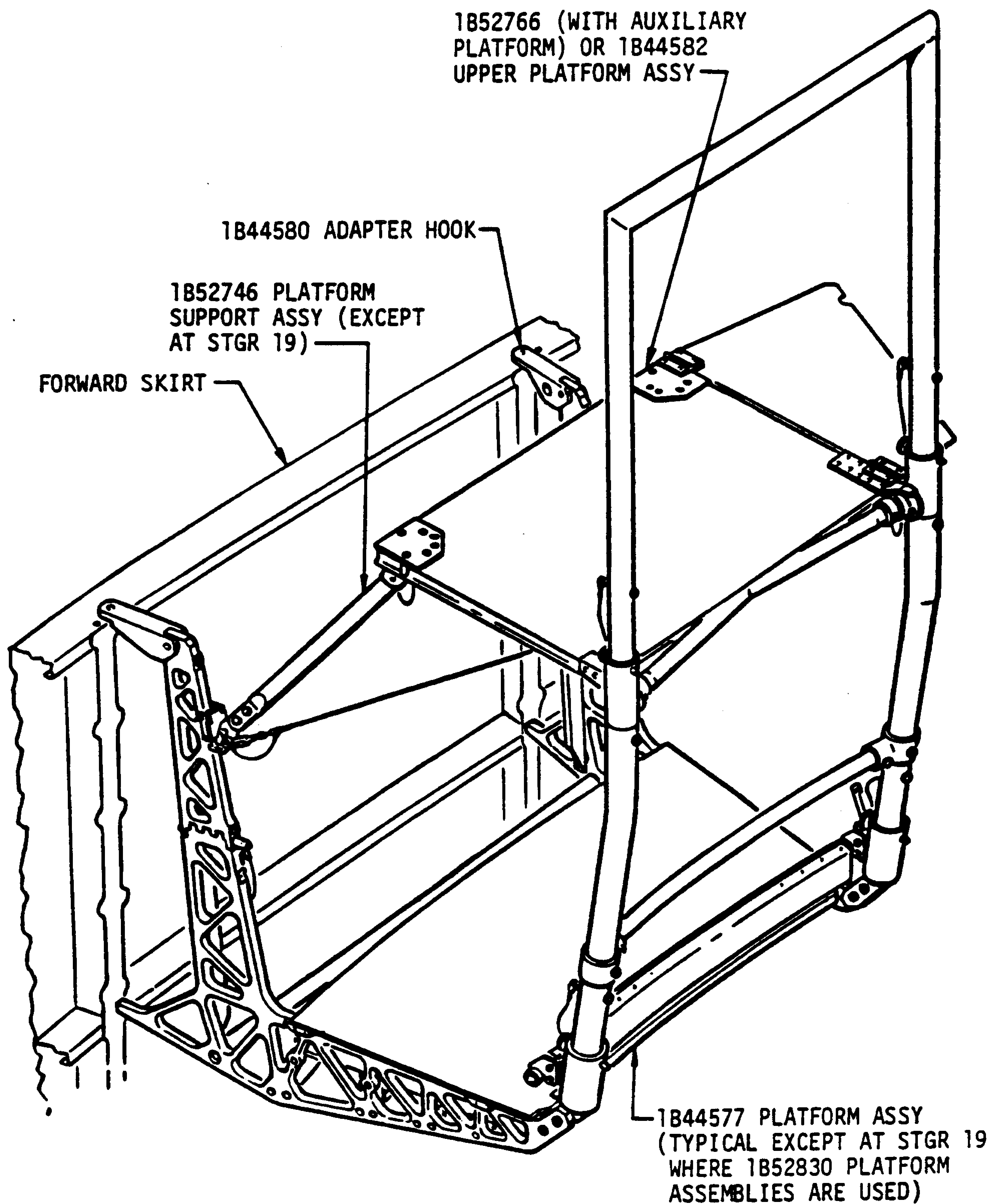
FORWARD SKIRT ACCESS KIT, MODEL 402 (1B40669)





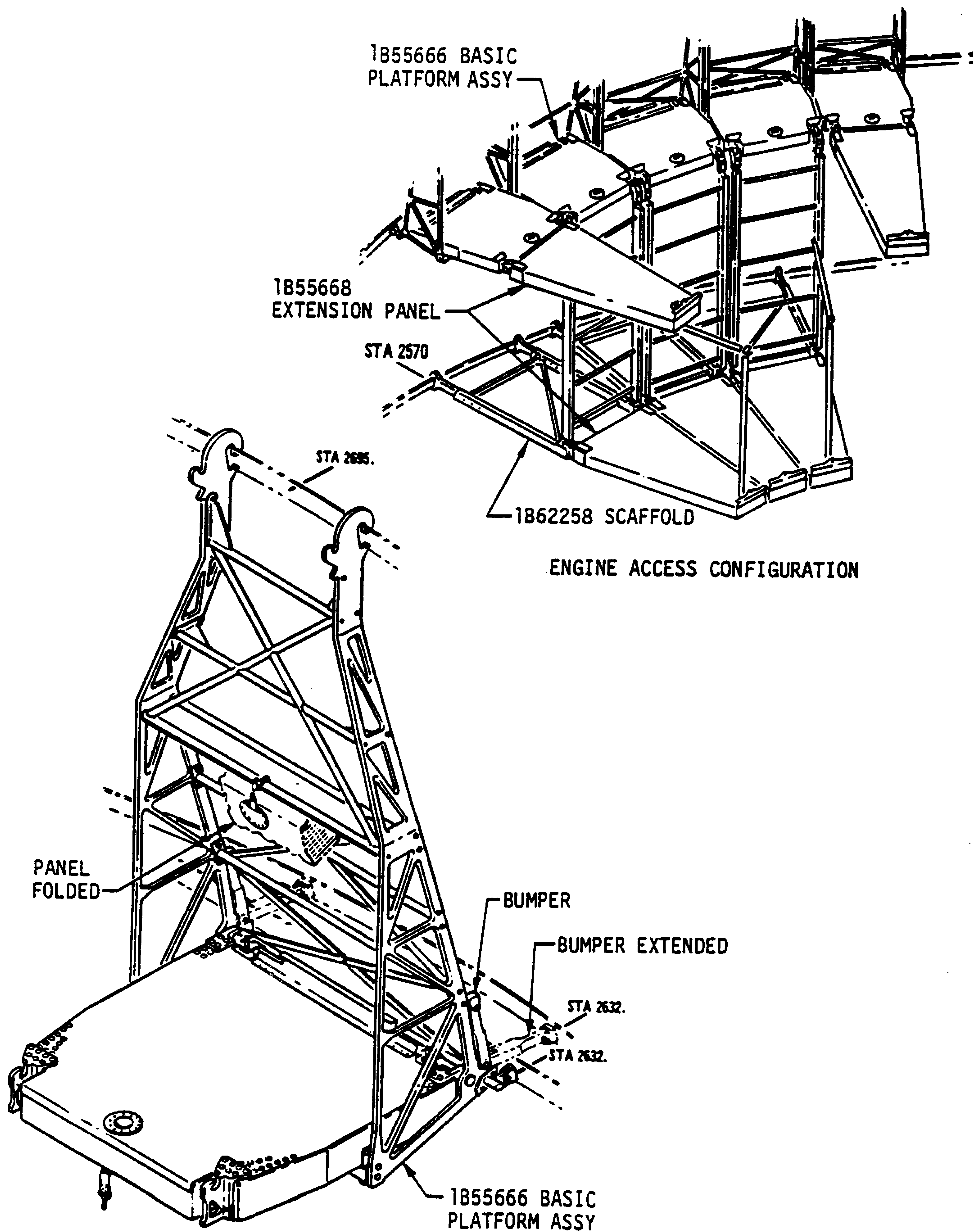
VIEW B-B  
(FROM PAGE 69)





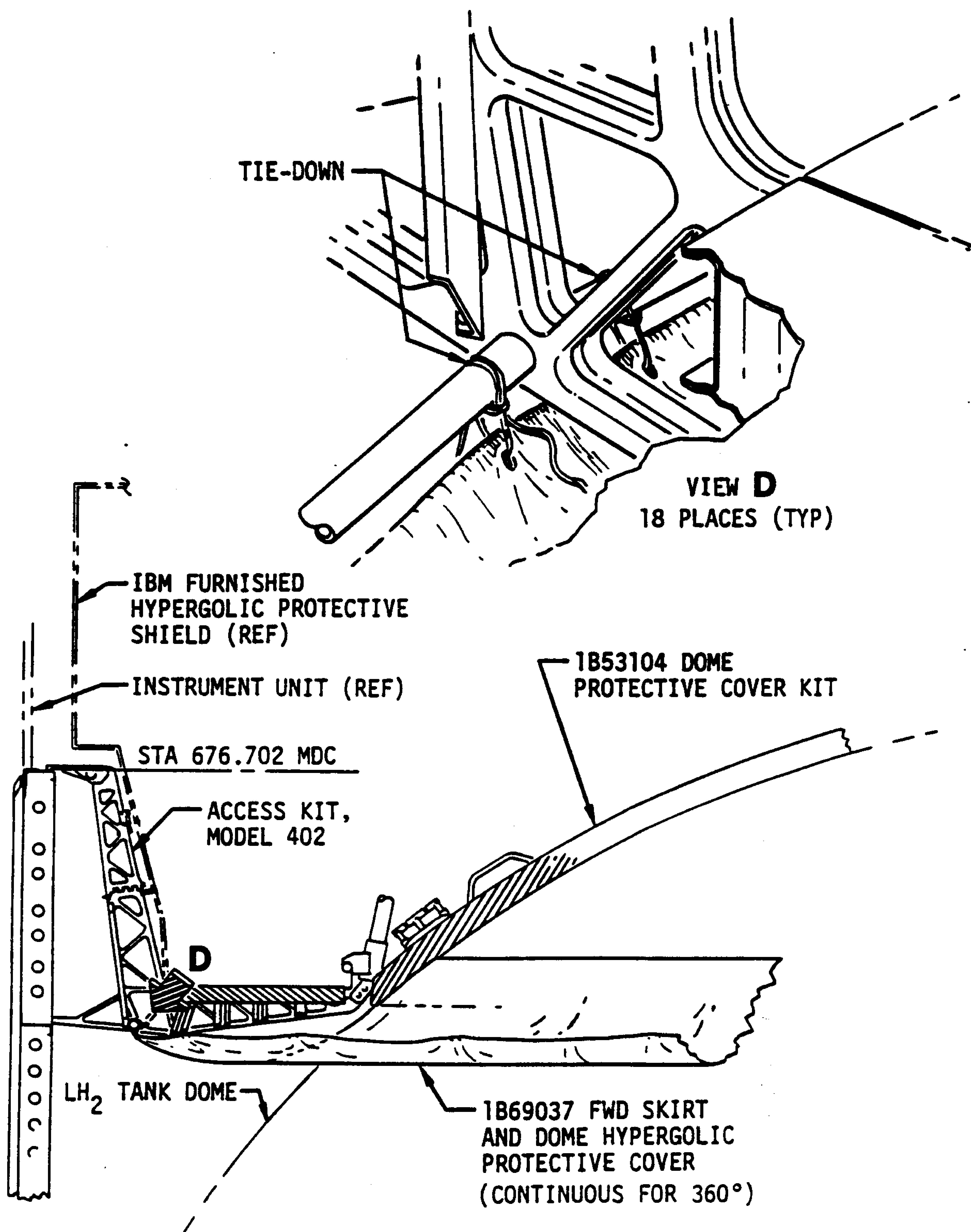
**FORWARD SKIRT ACCESS KIT - BASIC MODULE**





FLARED AFT SECTION ACCESS KIT - BASIC MODULE



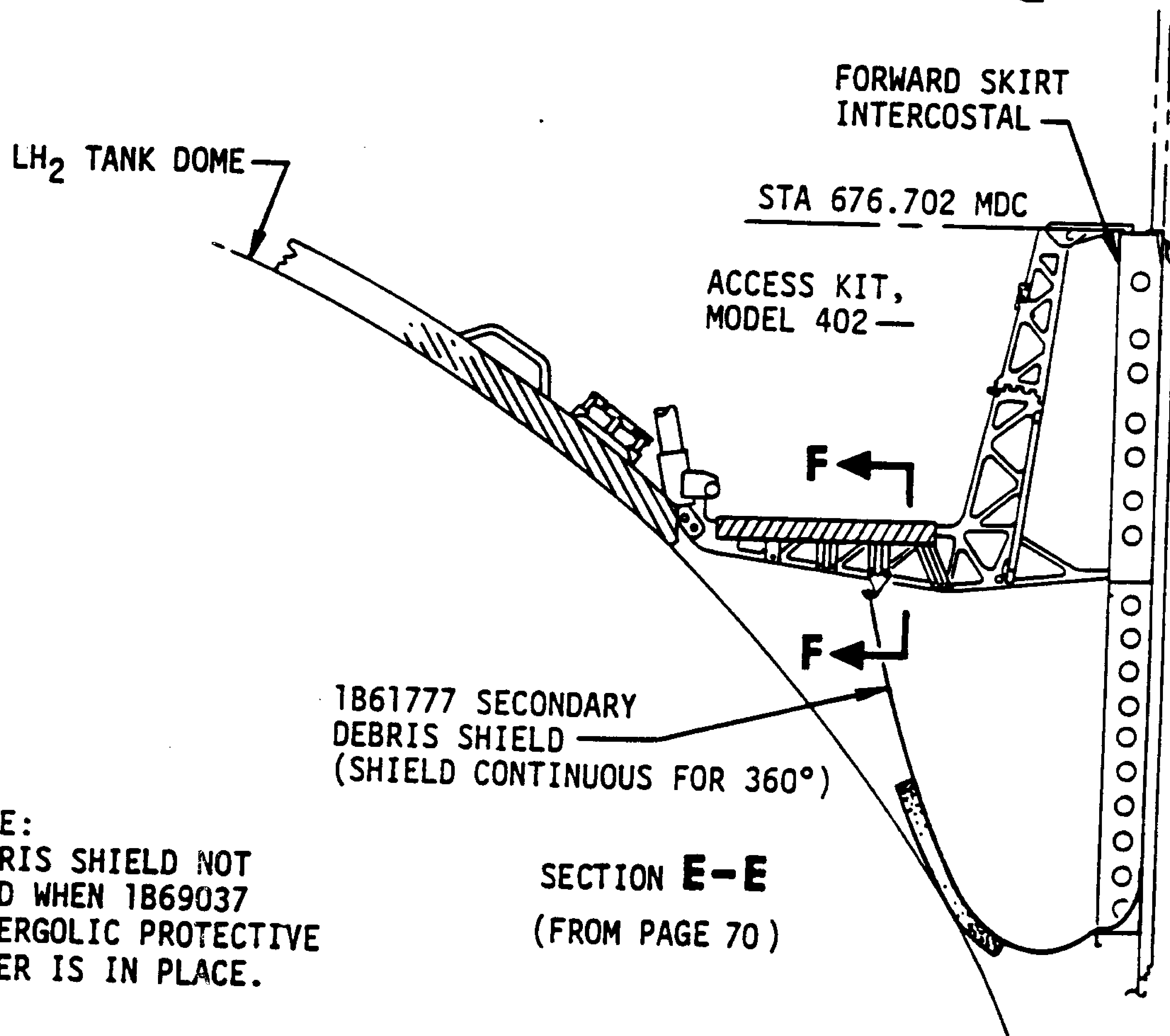
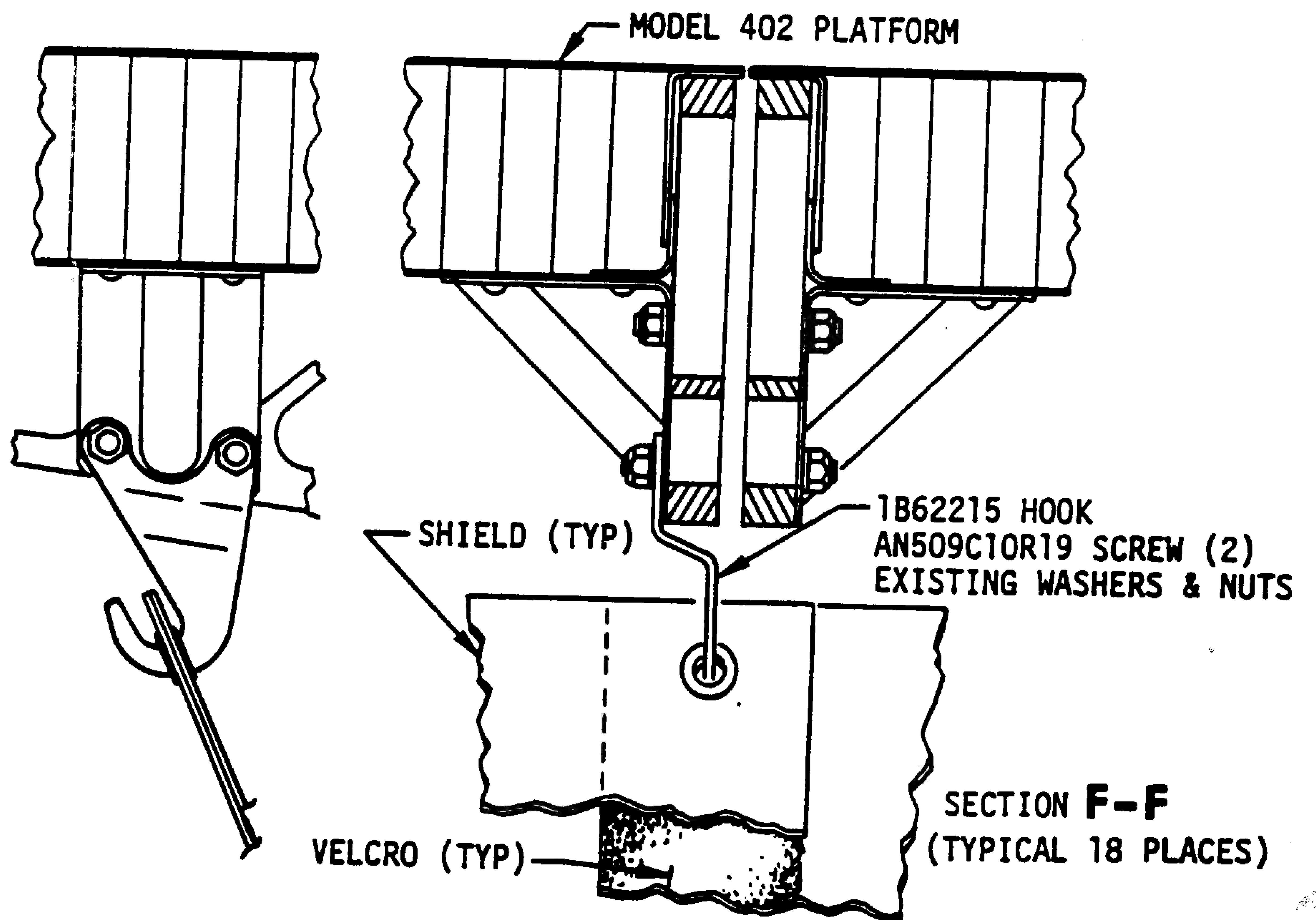


SECTION **C-C**  
(FROM PAGE 70)

NOTE:  
PROTECTIVE COVER NOT  
USED WHEN 1B61777  
DEBRIS SHIELD IS IN PLACE.

FORWARD SKIRT AND DOME HYPERGOLIC PROTECTIVE COVER (1B69037)





NOTE:  
DEBRIS SHIELD NOT  
USED WHEN 1B69037  
HYPERGOLIC PROTECTIVE  
COVER IS IN PLACE.

SECONDARY DEBRIS SHIELD (1B61777)



**APPENDIX 1**  
**STRUCTURES**  
**SPECIFICATIONS**



## Appendix 1. Structures Specifications

### FORWARD SKIRT - 1A39264 (501-509) and 1B69669 (510-515)

Radius to outside of skin . . . . .	130.000 inches
Length of skirt . . . . .	122.000 inches
Quantity and type of stringers . . . . .	108 hat stringers
Radius of forward bolt circle . . . . .	129.200 inches
Radius of aft bolt circle . . . . .	130.750 inches
Diameter of forward and aft bolts . . . . .	5/16 inch
Quantity of forward and aft holes . . . . .	216 each
Diameter of forward and aft holes . . . . .	0.342 inch 0.354
Quantity of forward end handling holes . . . . .	78
Diameter of forward end handling holes . . . . .	0.383 inch 0.394
Quantity of forward end alignment holes . . . . .	24
Diameter of forward end alignment holes . . . . .	0.316 inch 0.320
Skin gage . . . . .	0.032 7075-T6 aluminum

### TANK ASSEMBLY - 1A39303

#### ● Hydrogen Tank Assembly - 1A39306

Diameter of cylinder . . . . .	260.134 inches
Cylinder length . . . . .	268.555 inches
0.750 Skin . . . . .	Machined waffle pattern
Web thickness . . . . .	0.123 inch
Depth of 0.144-inch-wide ribs . . . . .	0.627 inch

(See forward and aft skirt data for hole information)



● Hydrogen Tank Forward Dome - 1A39304 (501-504) and 1B64442 (505-515)

Diameter at aft end . . . . .	259.702 inches for 501-504 259.736 inches for 505-515
Spherical radius from equatorial plane . . . . .	129.851 inches for 501-504 128.868 inches for 505-515
Machined skin segments (9 per stage) . . . . .	0.060 to 0.188 inch thick for 501-504 0.060 to 0.135 inch thick for 505-515

● Oxygen Tank Aft Dome - 1A39308 (501-504) and 1B63286 (505-515)

Diameter at forward end . . . . .	259.702 inches for 501-504 259.760 inches for 505-515
Spherical radius from equatorial plane . . . . .	129.851 inches for 501-504 129.880 inches for 505-515
Machined skin segments (9 per stage) . . . . .	0.082 to 0.318 inch thick for 501-504 0.096 to 0.295 inch thick for 505-515

● Common Bulkhead - 1A39309

Diameter at aft end . . . . .	125.009 inches
Spherical radius . . . . .	129.841 inches
Segments (9 each aluminum with honeycomb core) . . . .	1.750 inches thick



### THRUST STRUCTURE - 1A39316

Shape . . . . . 94° cone

Radius at forward end . . . . . 83.826 inches

Structure height at center . . . . . 65.342 inches

Radius at aft end . . . . . 13.721 inches

Six skin segments . . . . . 0.032 to 0.125  
inch thick

Quantity of stringers . . . . . 24 full length  
24 intermediate length

Quantity of ambient helium bottles . . . . . 10 each for 501 & 502  
9 each for 503 & 504  
8 each for 505-515

Dual repressurization system . . . . . 503-515

Dual-restart engine system . . . . . 503 & 504

### AFT SKIRT - 1A39295

Radius to outside of skin . . . . . 130.000 inches

Length of skirt . . . . . 85.500 inches

Quantity and types of stringers . . . . . 131 hat  
7 I-beam  
6 C-channel

Radius of forward bolt circle . . . . . 130.750 inches

Radius of aft bolt circle . . . . . 129.750 inches

Quantity of holes in forward end . . . . . 290 for 501 & 502  
292 for 503 - 515

Quantity of holes in aft end . . . . . 288

Diameter of forward end holes . . . . . 0.279  
0.289 inch

Diameter of forward end bolts . . . . . 1/4 inch

Diameter of aft end holes . . . . . 0.343  
0.352 inch



AFT SKIRT - 1A39295 (continued)

Diameter of aft end bolts . . . . . 5/16 inch  
Skin gage . . . . . 0.040 7075-T6 aluminum  
Quantity of aft end handling holes . . . . . 56  
Diameter of aft end handling holes . . . . . 0.384  
0.394 inch

INTERSTAGE, FLARED - 1A70704

Radius of forward end . . . . . 130.095 inches  
Length of interstage at center line . . . . . 127.000 inches  
Radius of aft end . . . . . 198.375 inches  
Quantity and type of stringers . . . . . 144 modified hat  
stringers  
Radius of forward bolt circle . . . . . 129.188 inches  
Radius of aft bolt circle . . . . . 196.875 inches  
Quantity of holes in forward and aft ends . . . . . 288  
Diameter of holes in forward end . . . . . 0.343  
0.352 inch  
Diameter of holes in aft end . . . . . 0.404  
0.416 inch  
Diameter of aft end bolts . . . . . 3/8 inch

FORWARD BOLTS - NASA STA 3222.555 (501-515)

Total NAS625-5 bolts . . . . . 216  
Total MS20002C5 washers . . . . . 216  
Total NAS687A5 nutplates . . . . . 216



AFT BOLTS - NASA STA 2519 (502-515)

Total bolts . . . . .	288
EWB0420-6-18C bolts . . . . .	8
EWB0420-6-17C bolts . . . . .	24
EWB0420-6-12C bolts . . . . .	256
MS20002C6 washers (under head) . . . . .	288
MS20002-6 washers (under nut) . . . . .	288
61170-624 nuts . . . . .	288

TABLE 1-1. CROSS REFERENCE OF NASA AND MDAC  
SERIAL NUMBERS FOR SATURN V

NASA VEHICLE S/N	MDAC STAGE S/N	MDAC INTERSTAGE S/N
501	1005	1005
502	1006	1006
503	1008*	1007
504	1009	1008
505	1010	1009
506	1011	1010
507	507	507
thru	thru	thru
515	515	515

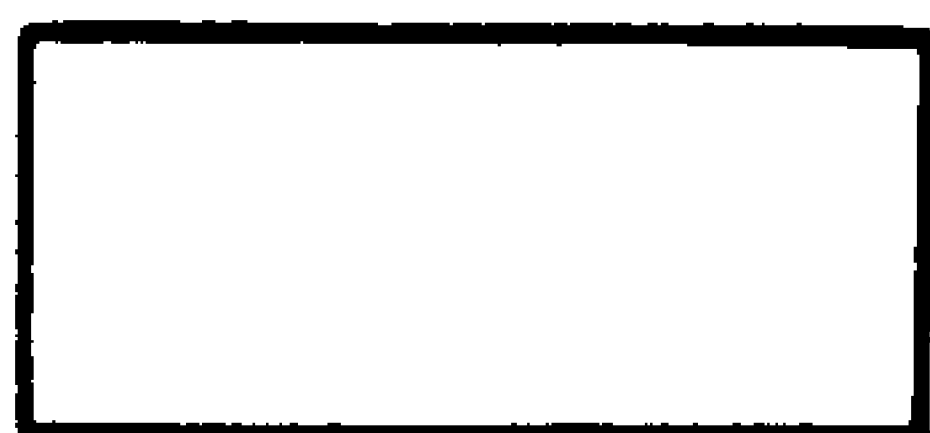
\* ORIGINAL MDAC UNIT FOR AS-503 WAS  
UNIT S/N 1007. THIS UNIT WAS EXPENDED  
DURING STATIC TESTING AND WAS RE-  
PLACED BY UNIT S/N 1008 FOR FLIGHT  
TESTING. HOWEVER, THE S/N 1007  
INTERSTAGE WAS NOT REPLACED.



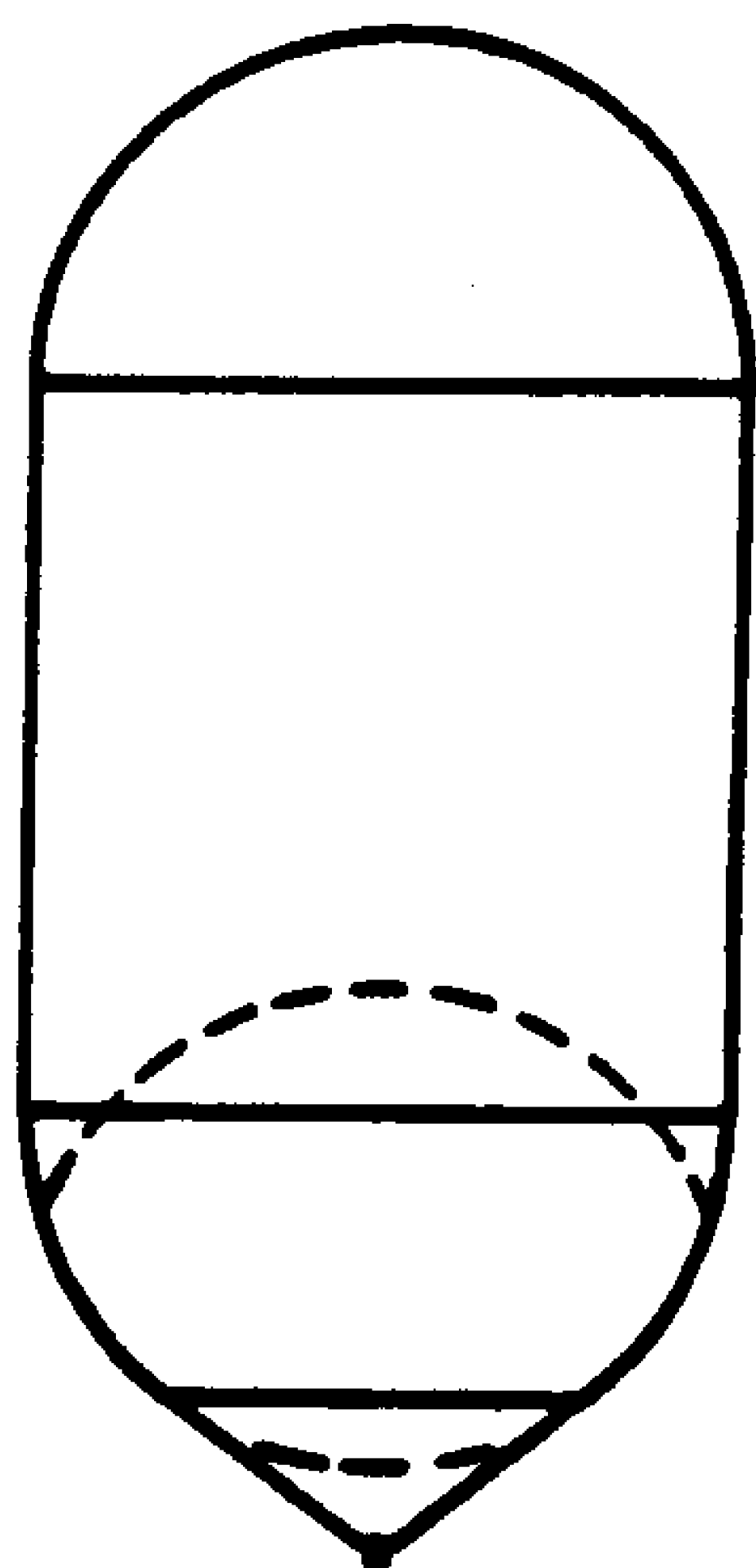
**APPENDIX 2**  
**STAGE DIAGRAMS**



## Appendix 2. Stage Diagrams



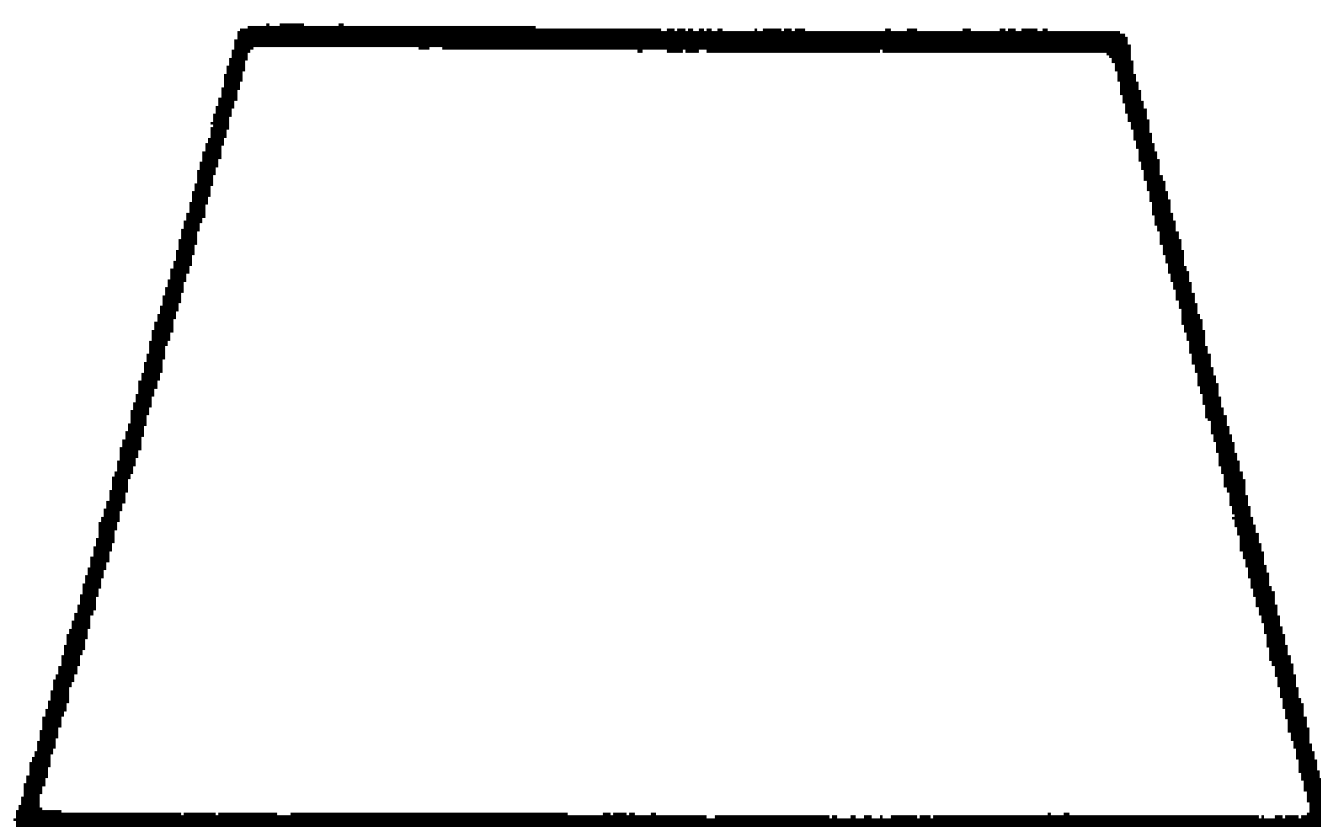
FWD SKIRT ASSY  
1A39264-1



TANK ASSY IDENTICAL  
WITH IB CONFIG NOT  
TESTED AS SV



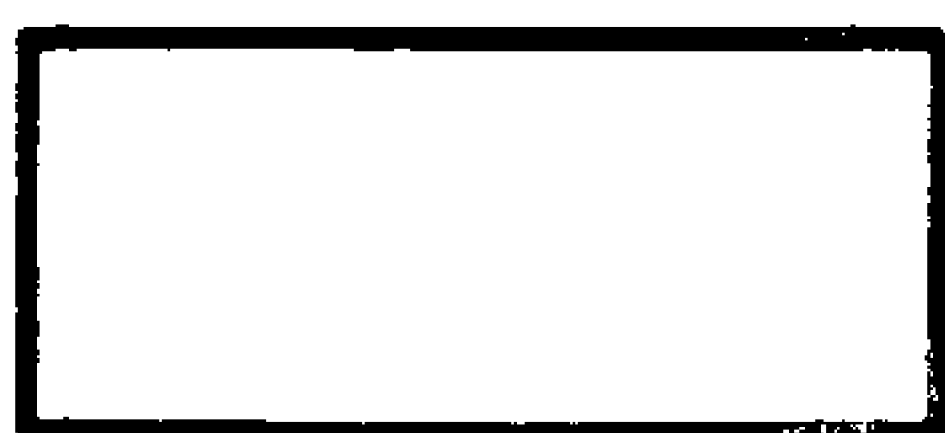
AFT SKIRT ASSY  
1A39295-501



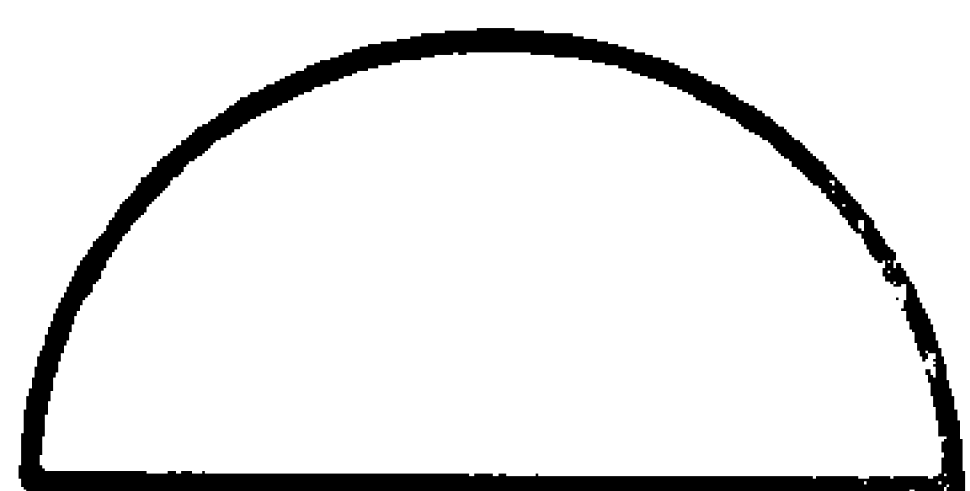
INTERSTAGE ASSY  
1B36102-1

STATIC TEST STAGE

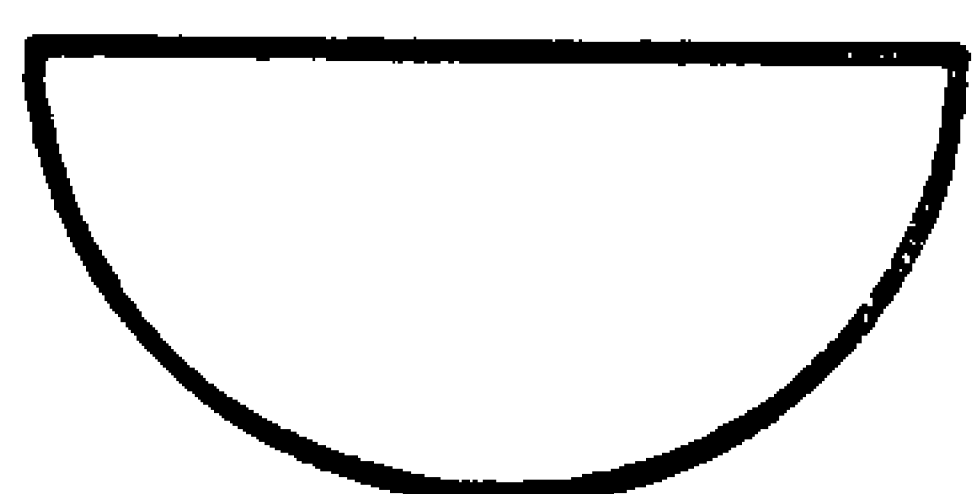




FWD SKIRT ASSY  
1A39264-505



FWD DOME ASSY  
1T07917-7



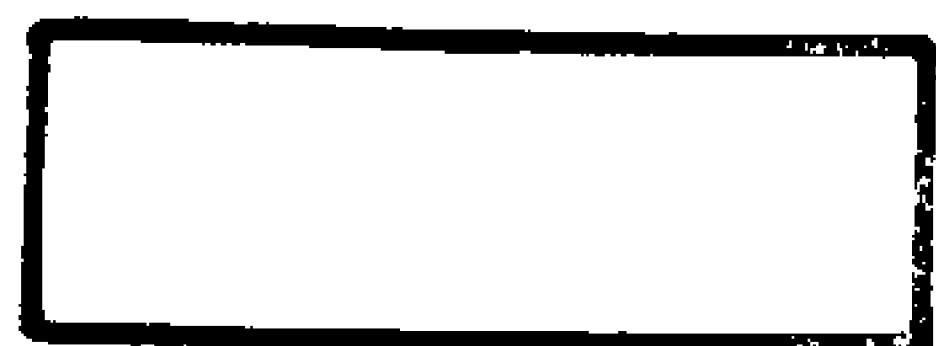
AFT DOME ASSY  
1A39308-511



BAFFLE INSTL  
1A39267-503



THRUST STRUCTURE  
1A39316-505



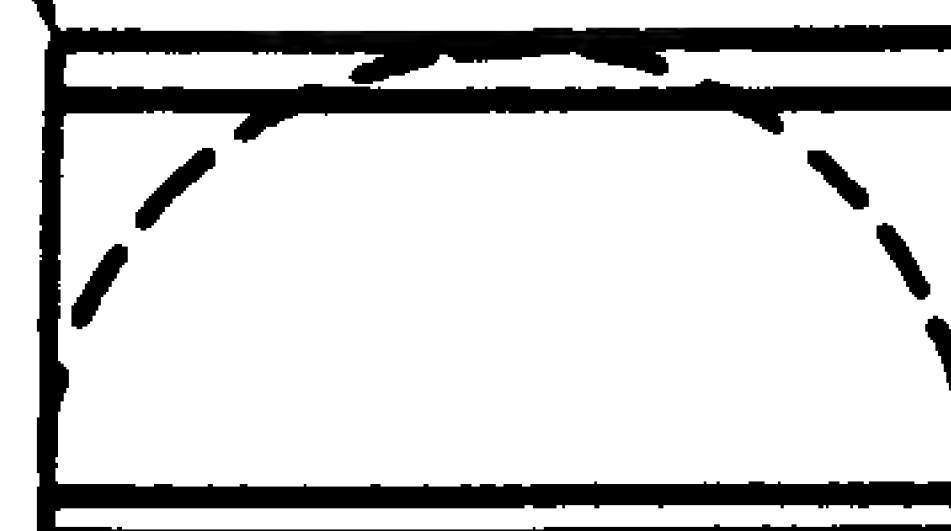
AFT SKIRT INSTL  
1A39310-503



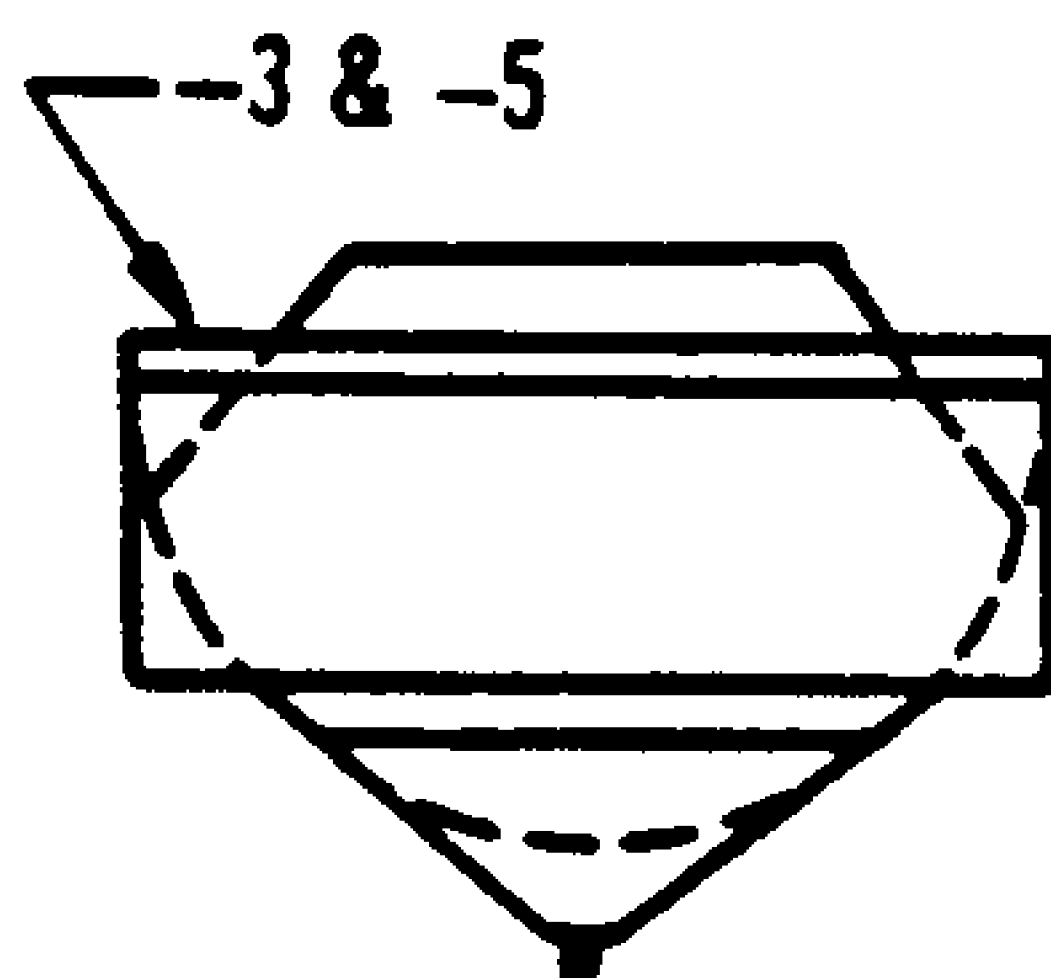
FWD SKIRT - DOME AREA  
1T07917-1

-9 & -11

FWD EXTENSION  
1T08921



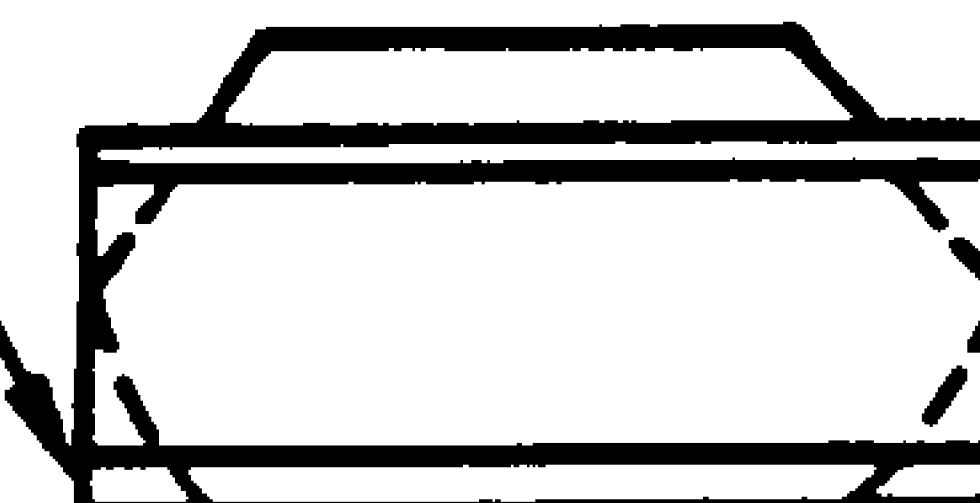
TEST SPECIMEN - FWD SKIRT  
1T07834



AFT SKIRT - DOME AREA  
1T07916-1

-3 & -5

AFT EXTENSION  
1T08941

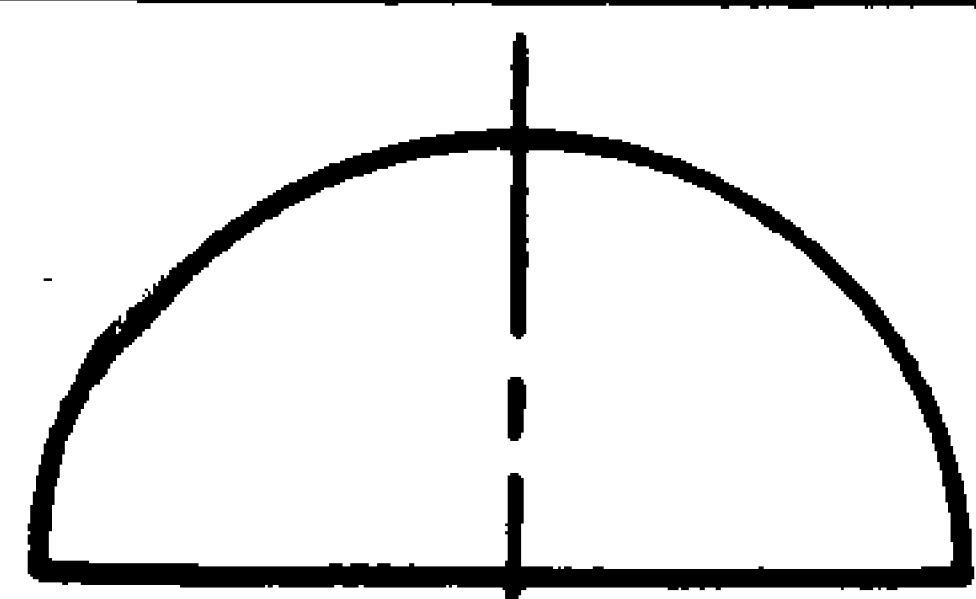
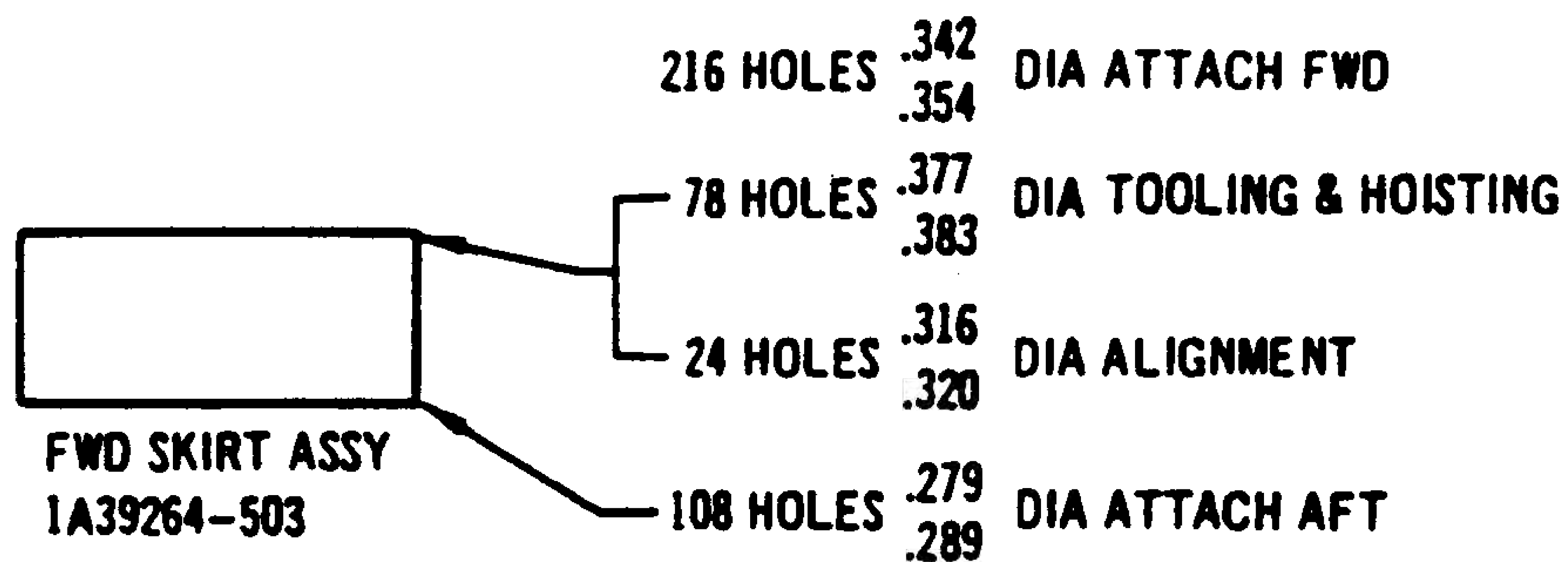


ENGINE ASSY  
(SIMULATED)  
1B33745

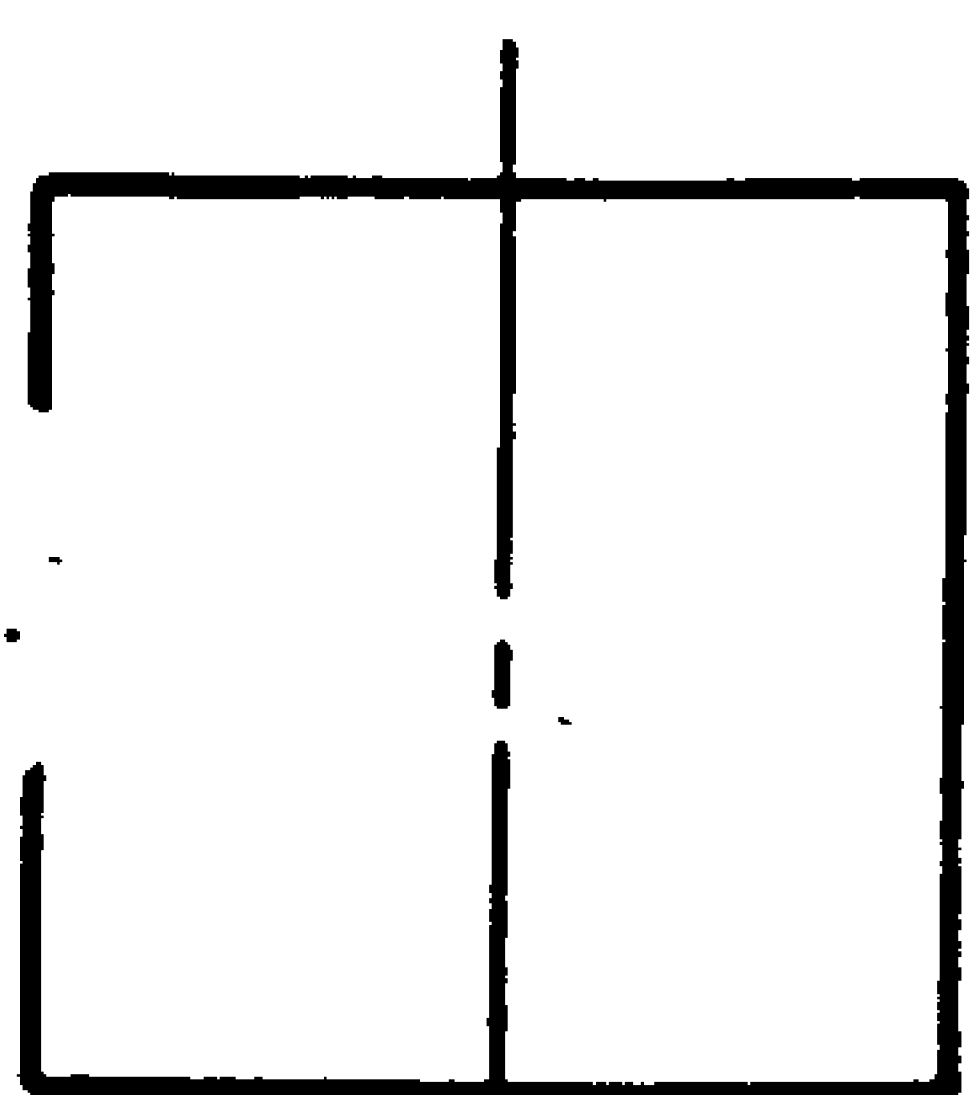
TEST SPECIMEN - BOATTAIL  
1T07836

HIGH FORCE TEST STAGE (9004)

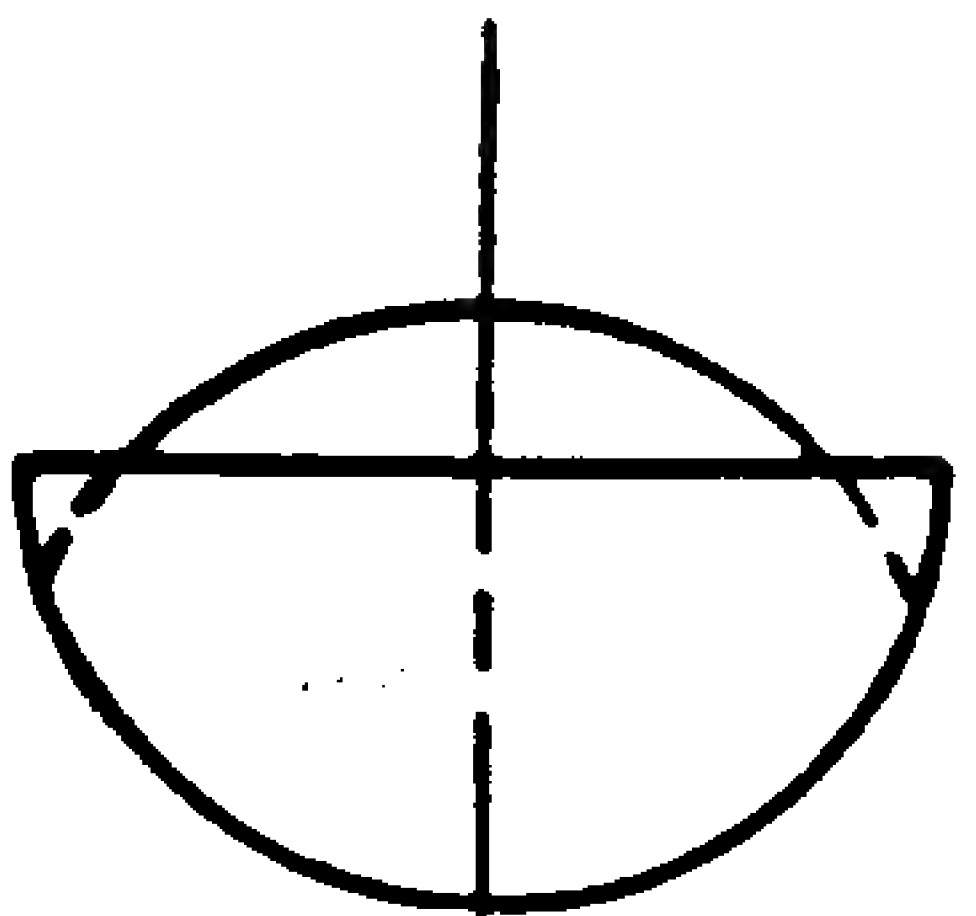




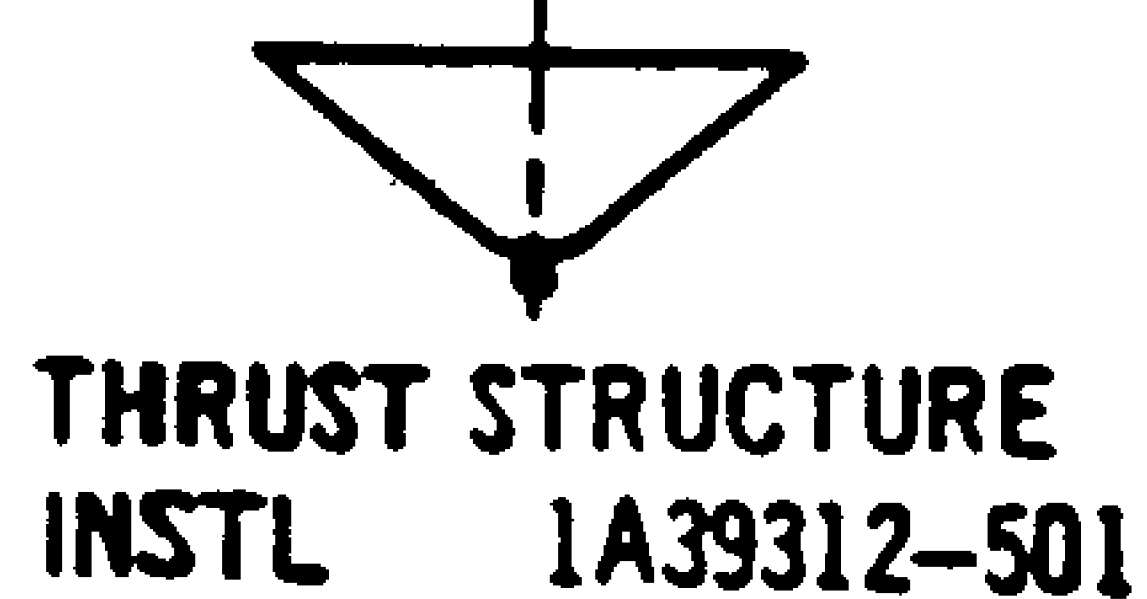
FWD DOME ASSY  
1A39304-1



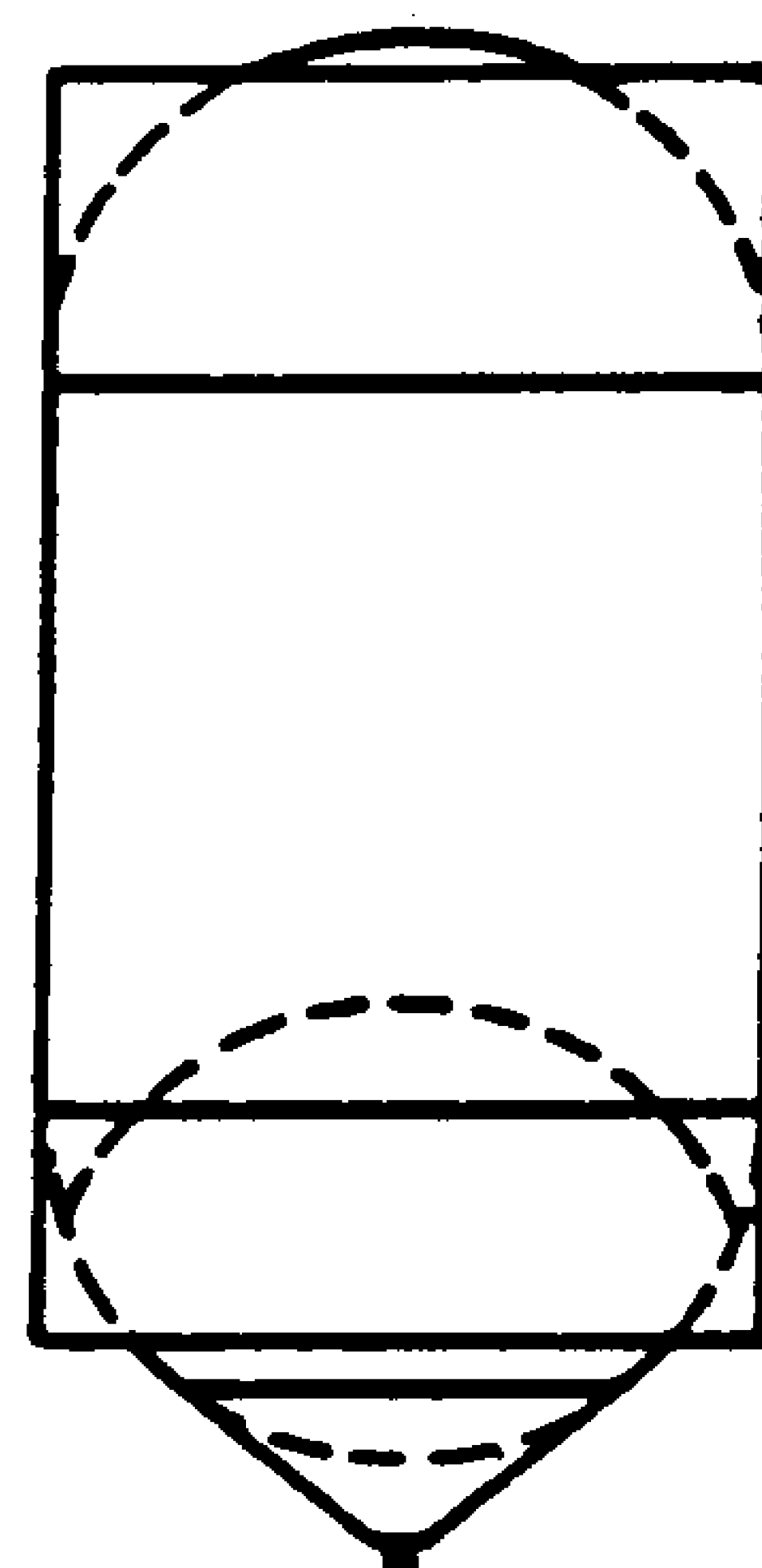
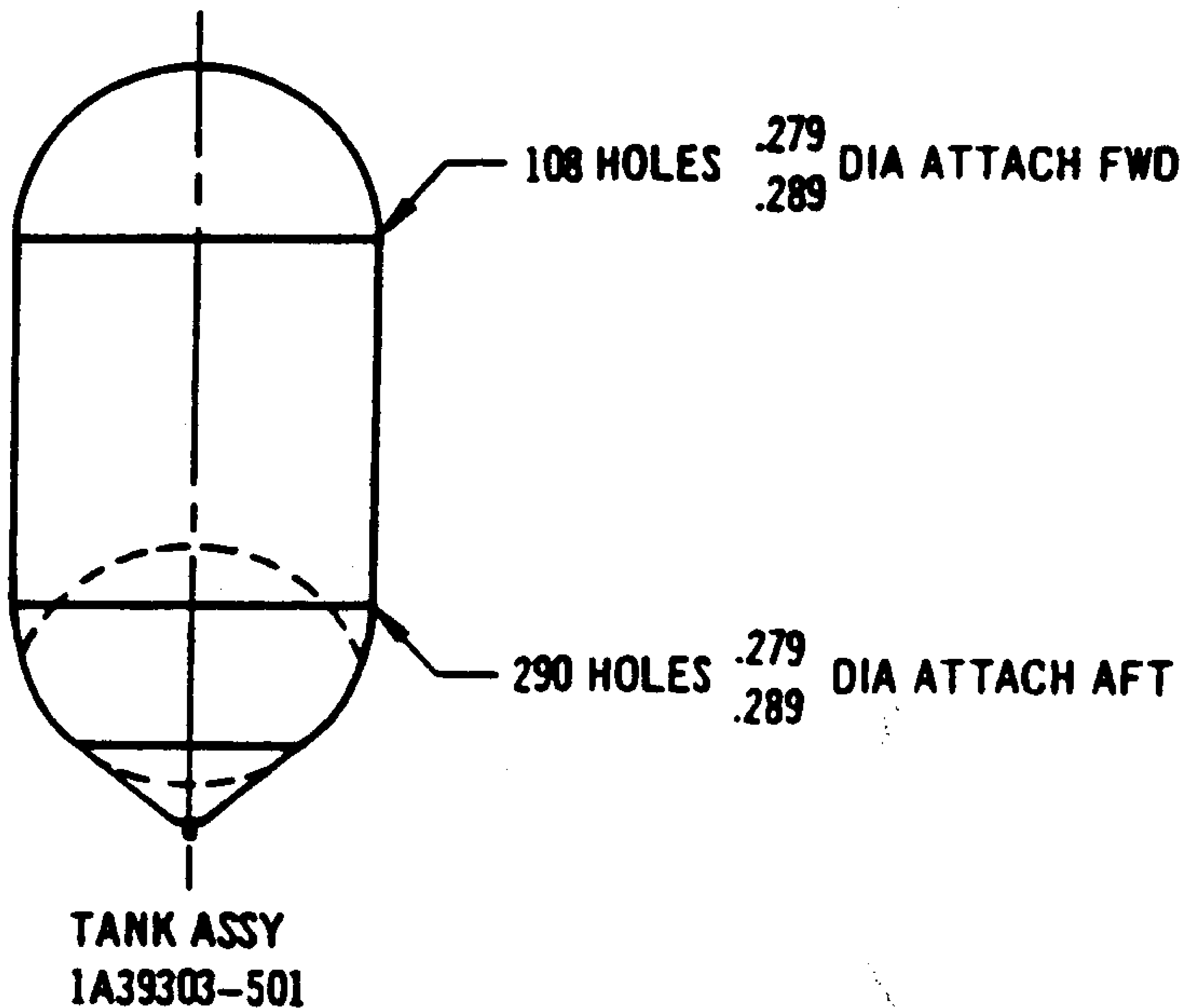
CYLINDER ASSY  
1A39306-501



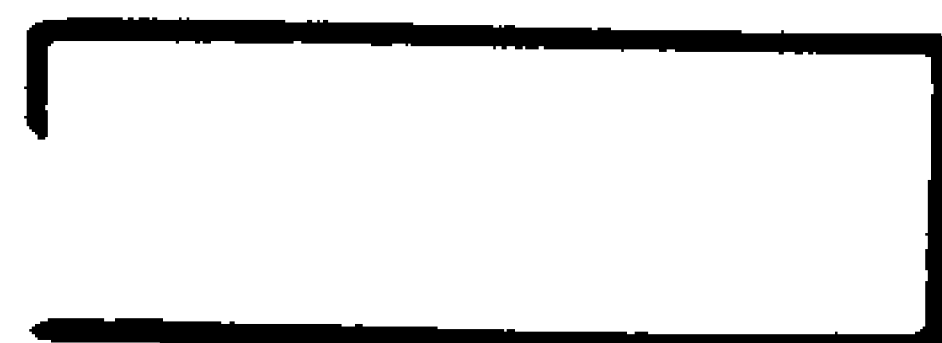
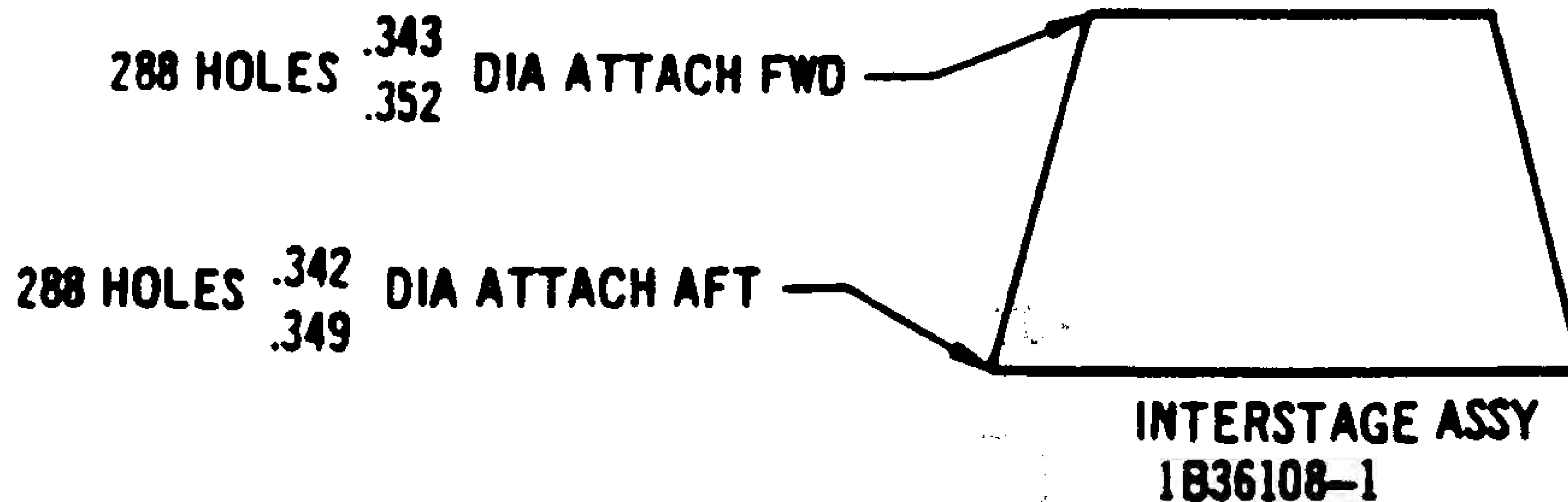
LOX TANK ASSY  
1A39307-501



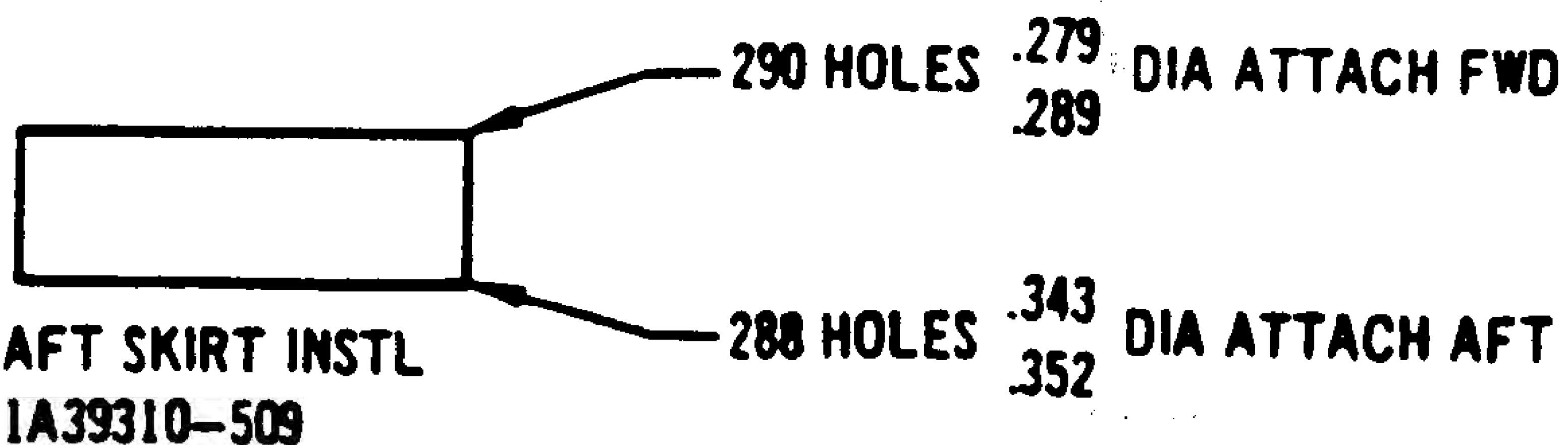
THRUST STRUCTURE  
INSTL 1A39312-501



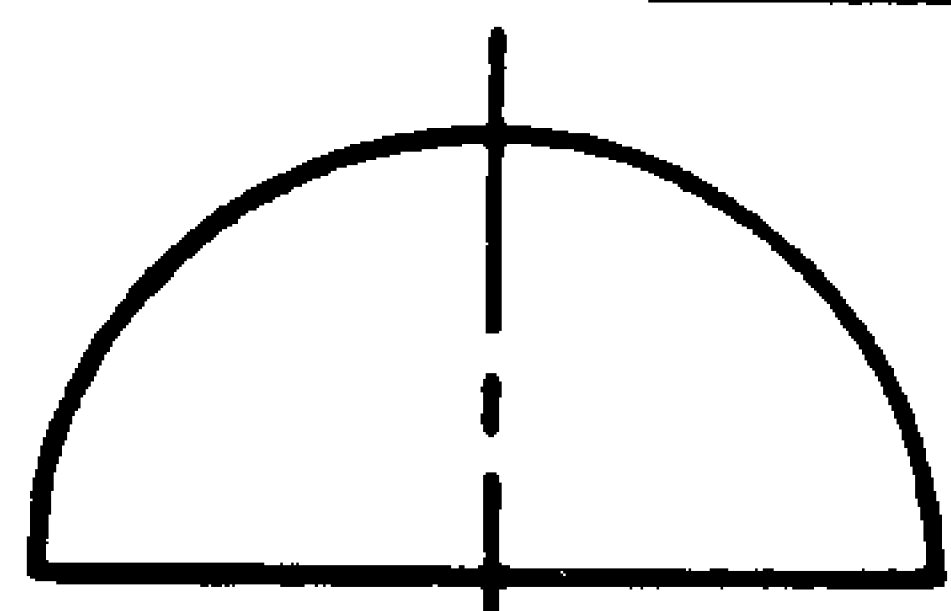
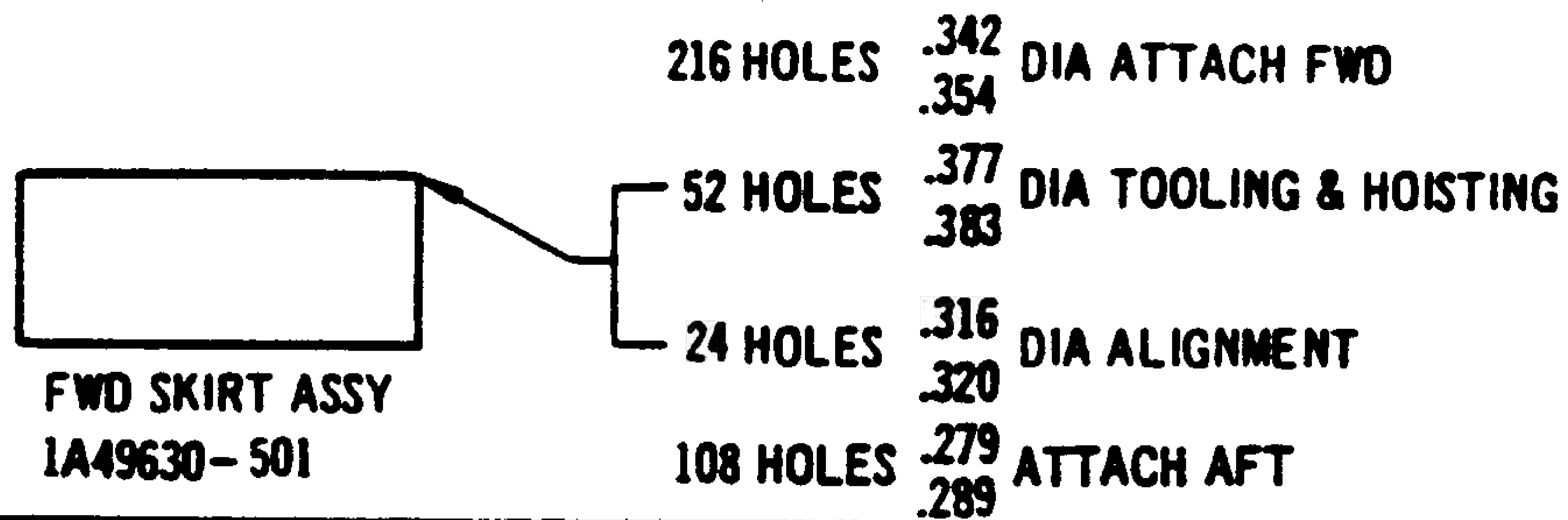
STRUCTURAL ASSY  
1B28888



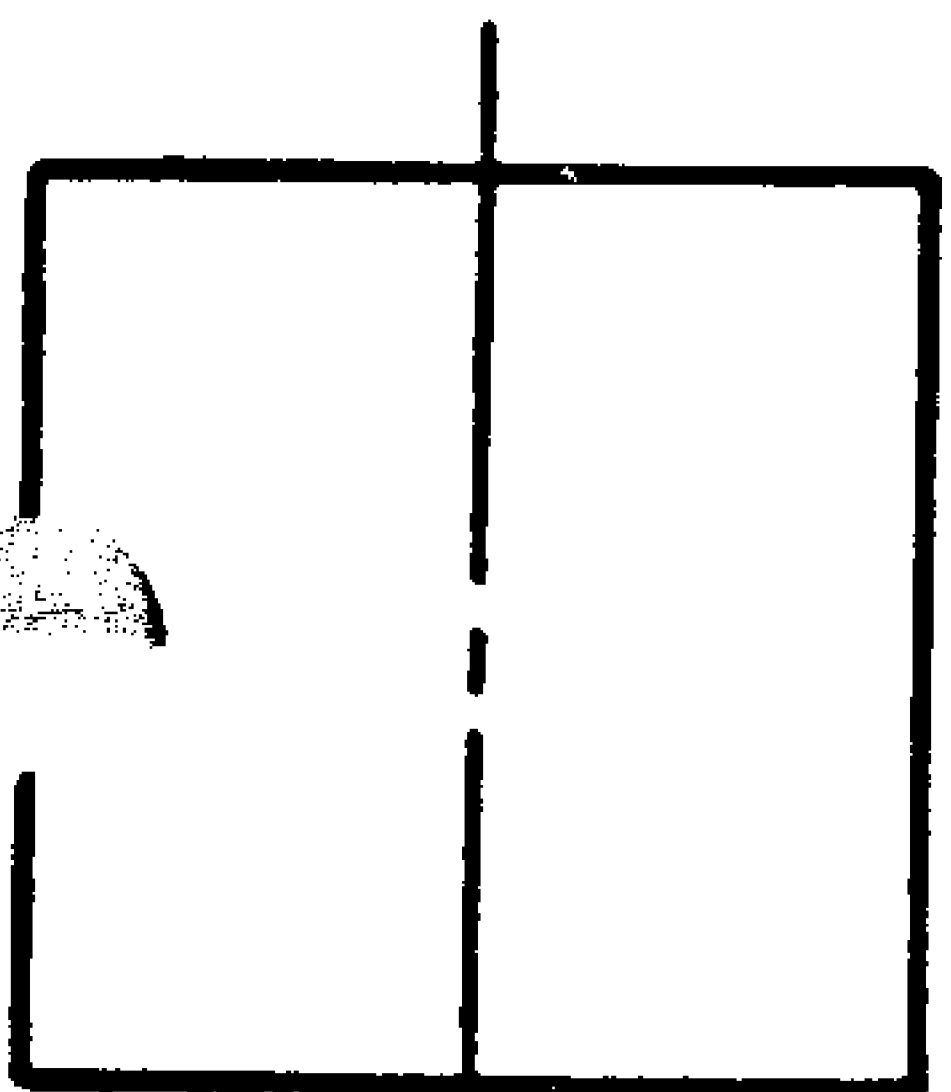
AFT SKIRT ASSY  
1A39295-507



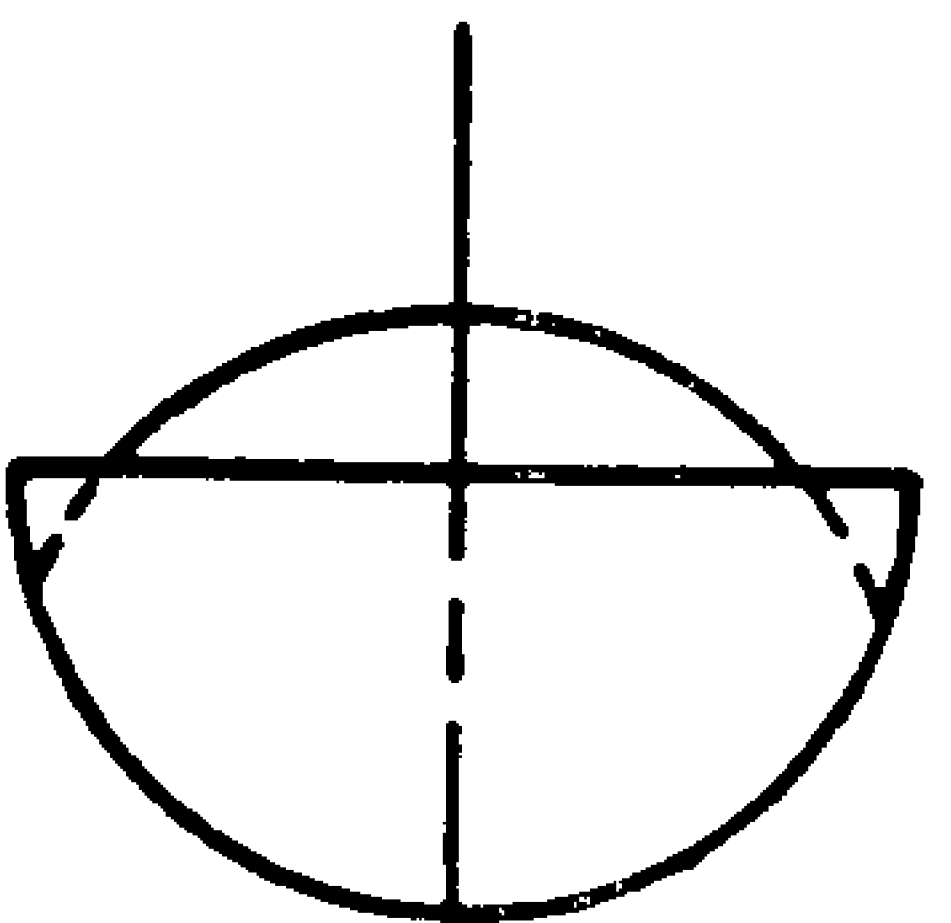




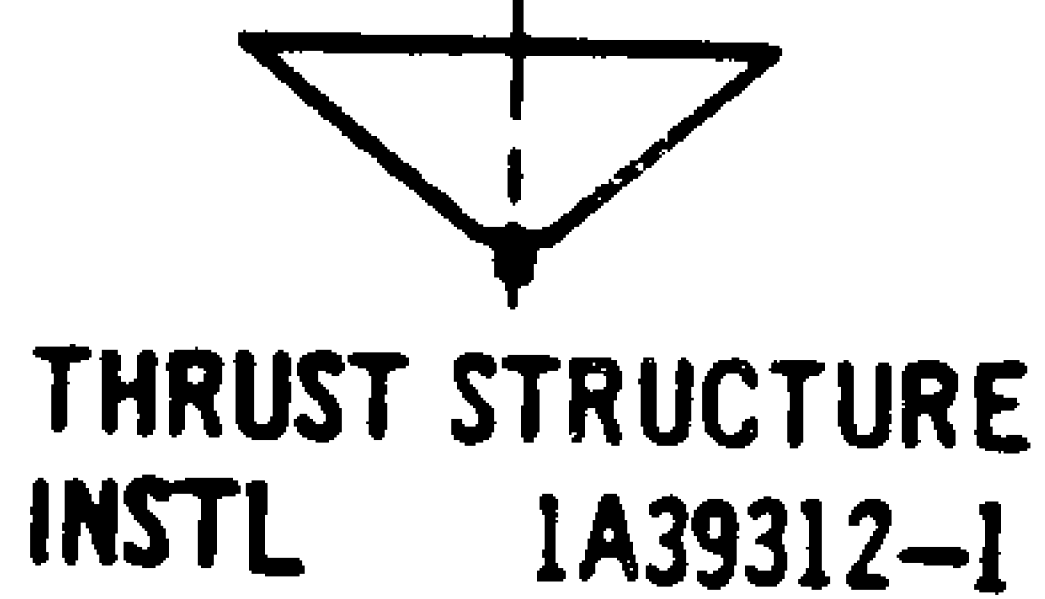
FWD DOME ASSY  
1A39304-501



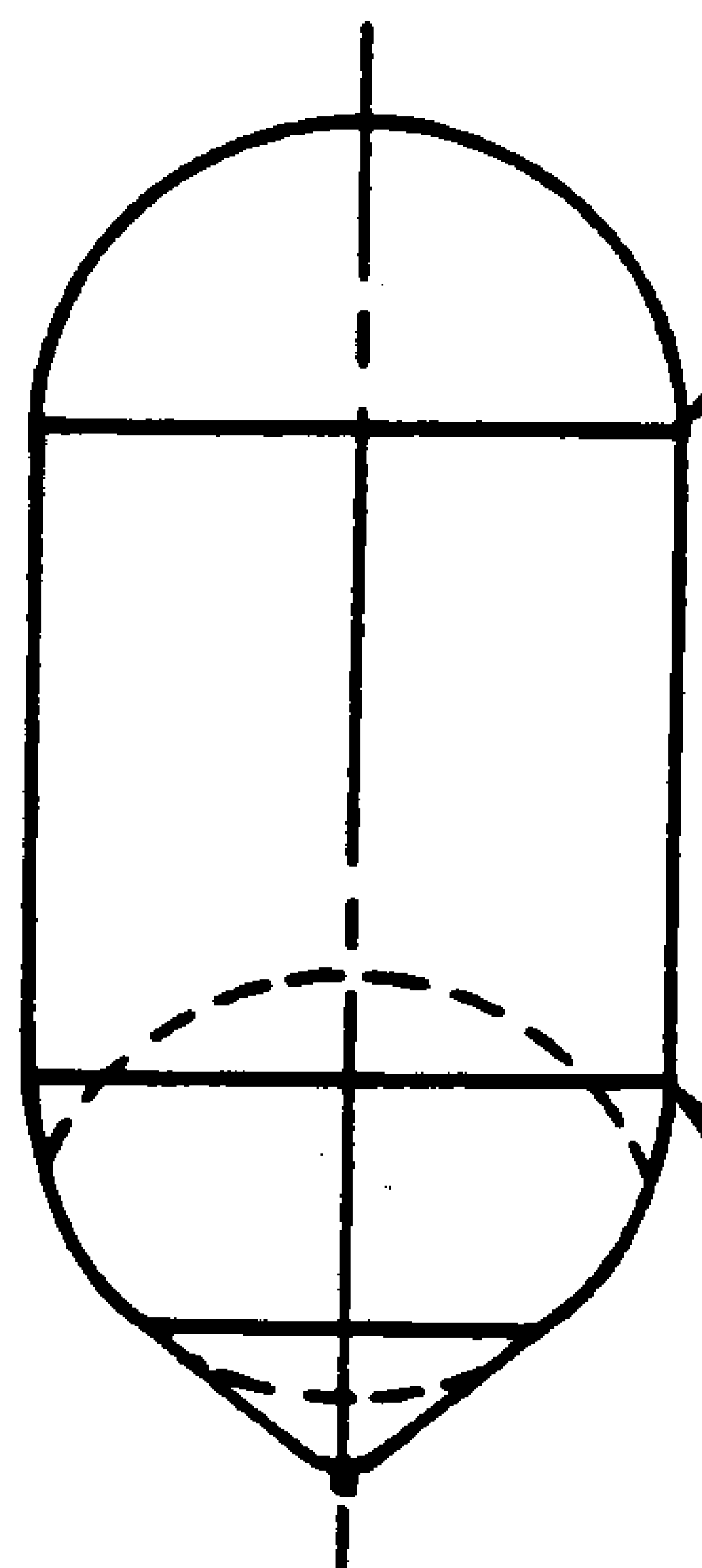
CYLINDER ASSY  
1A39306-501



LOX TANK ASSY  
1A39307-503



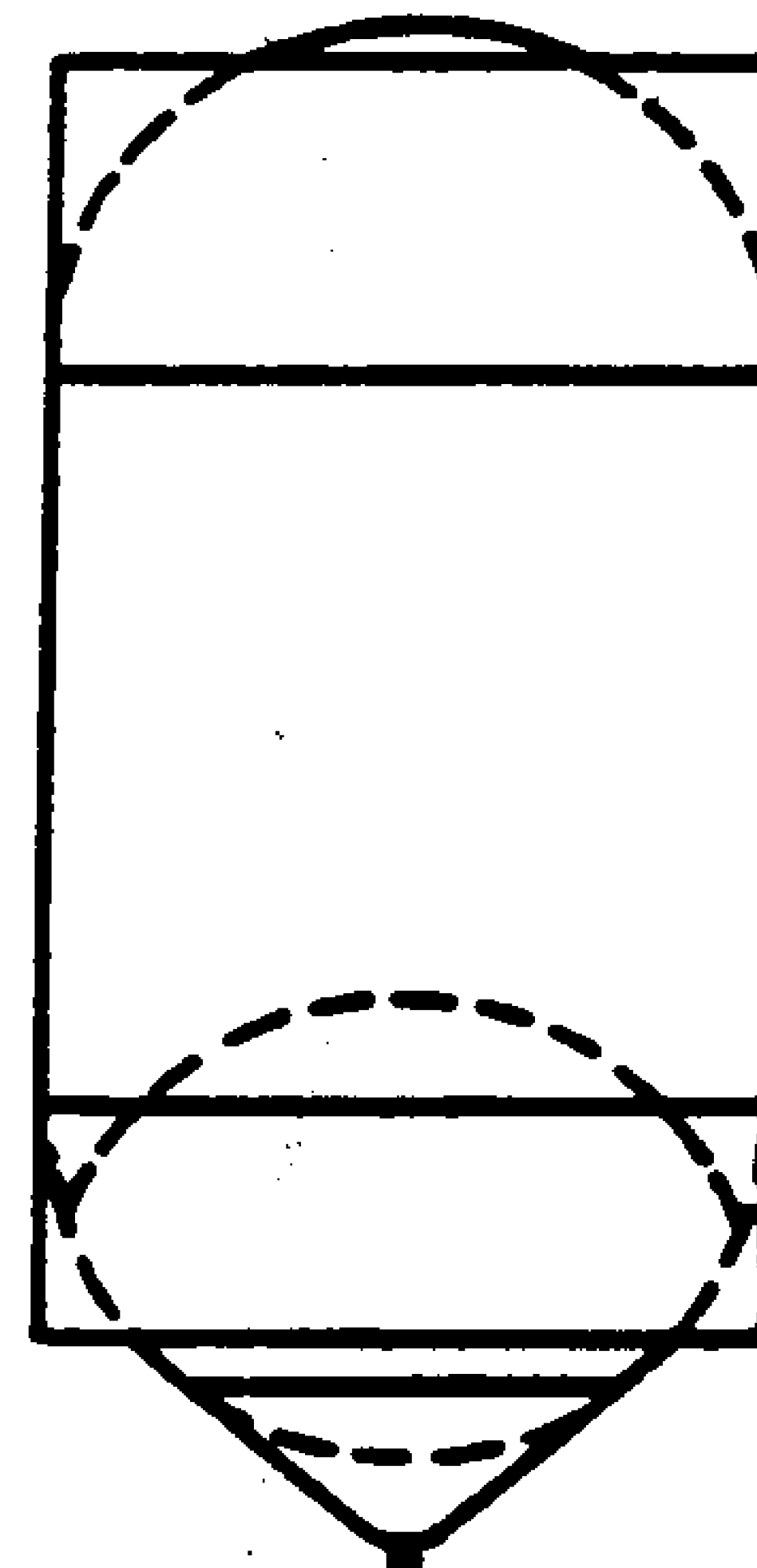
THRUST STRUCTURE  
INSTL 1A39312-1



TANK ASSY  
1A39303-505

108 HOLES .279 DIA ATTACH FWD  
.289

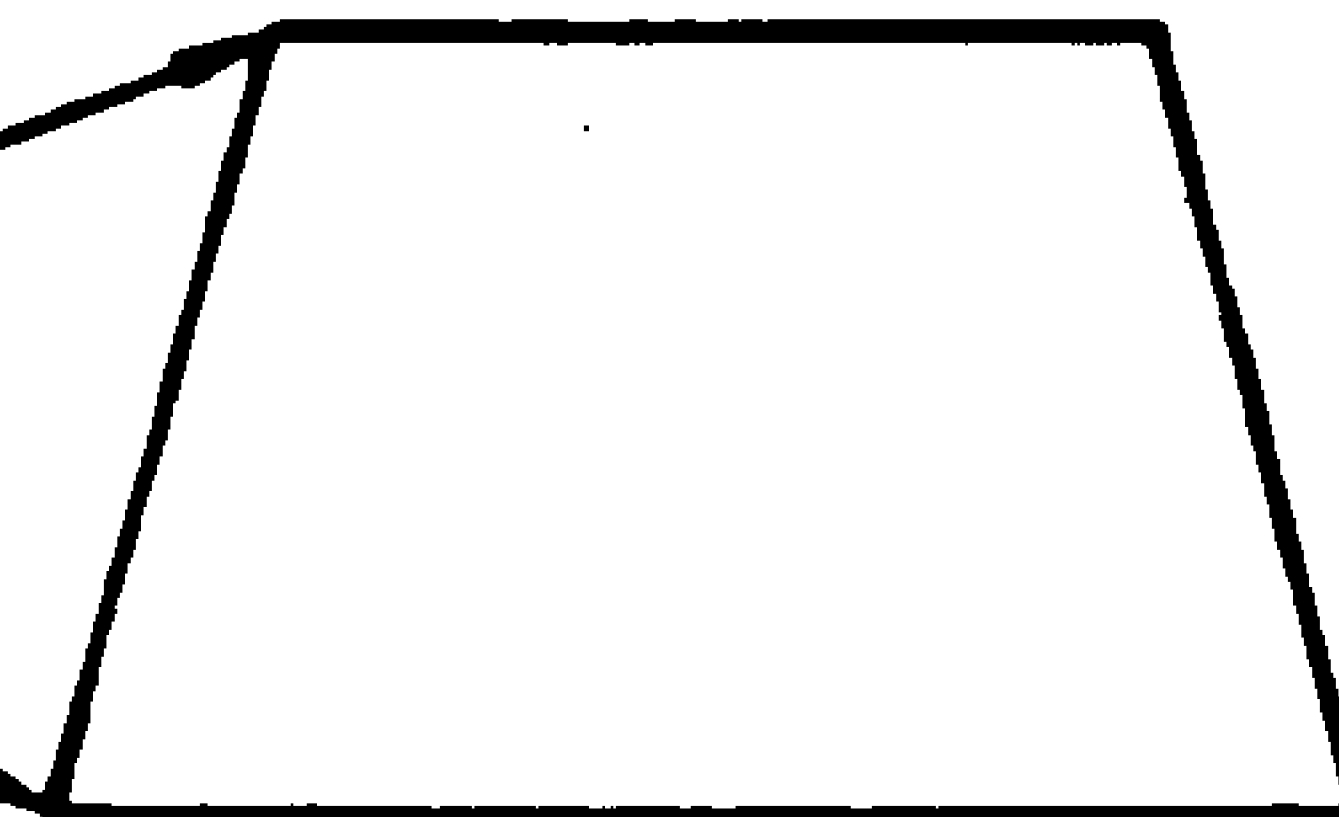
290 HOLES .279 DIA ATTACH AFT  
.289



STRUCTURAL ASSY  
1B28890

288 HOLES .343 DIA ATTACH FWD  
.352

288 HOLES .342 DIA ATTACH AFT  
.349



INTERSTAGE  
1B36109-1



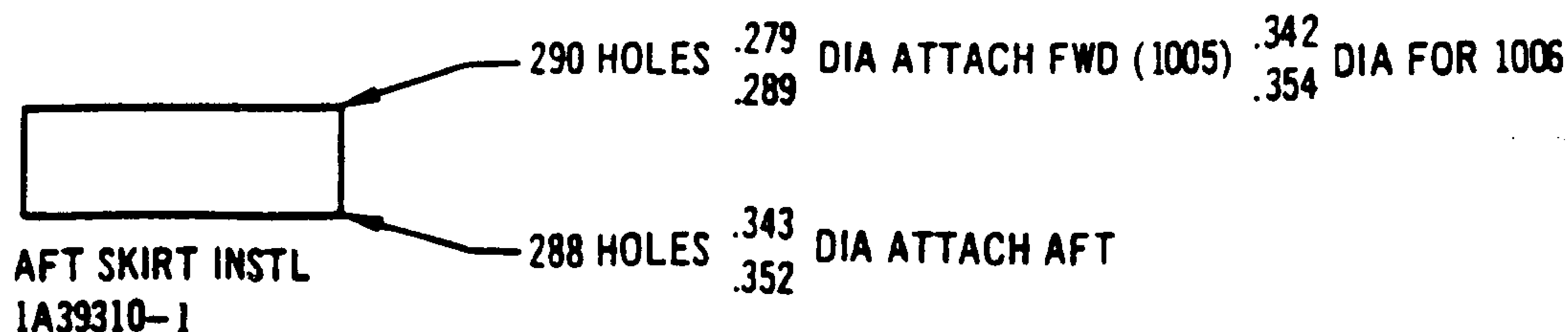
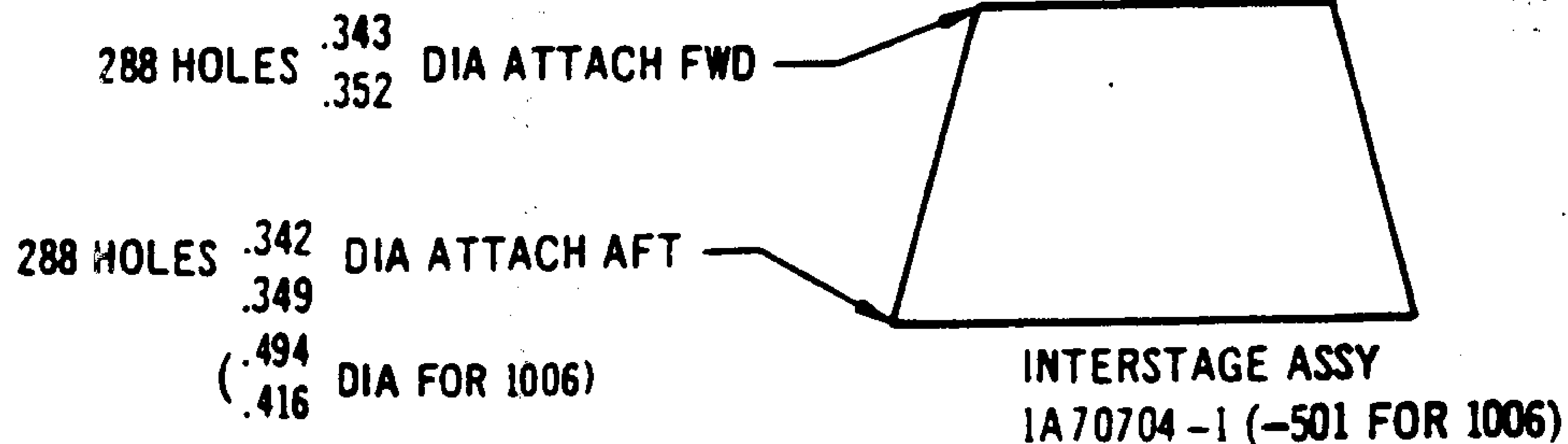
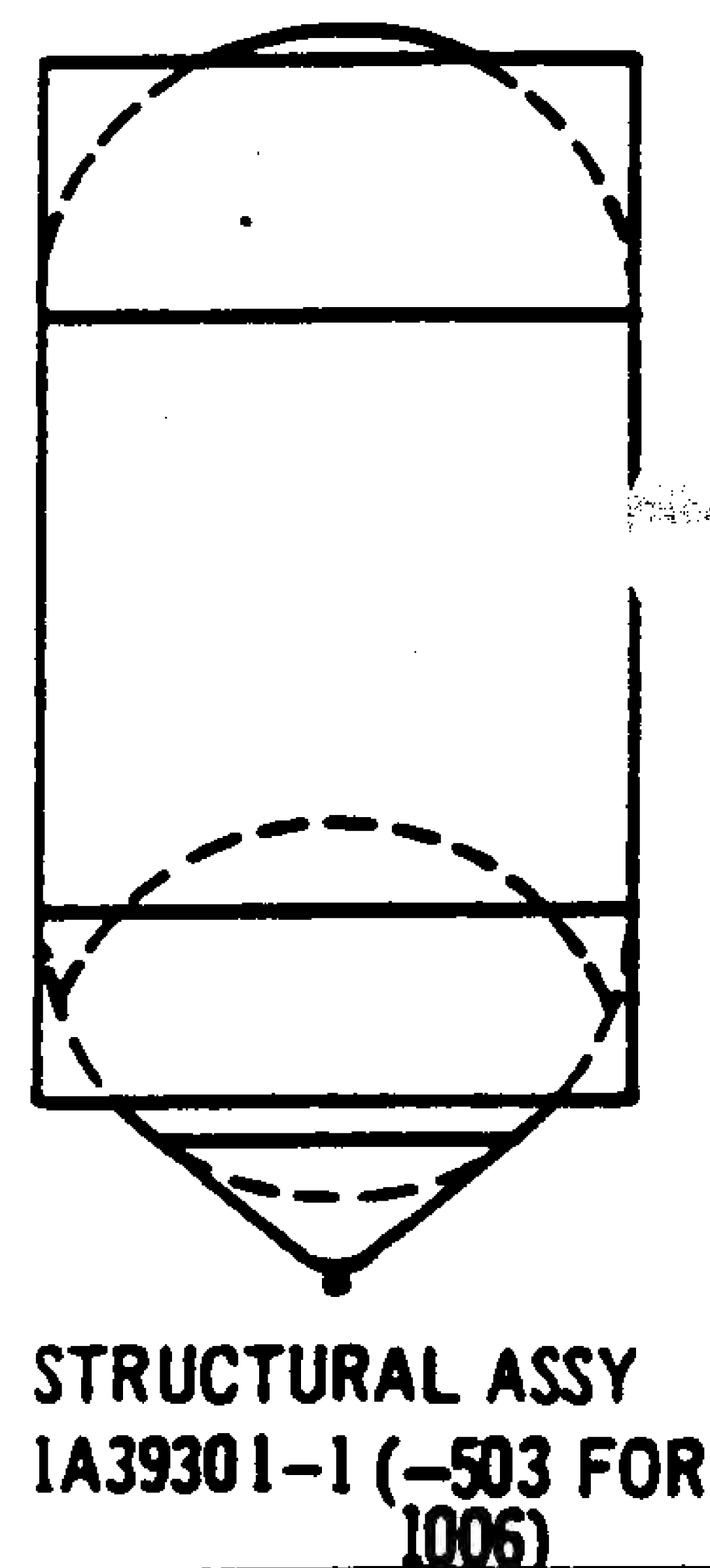
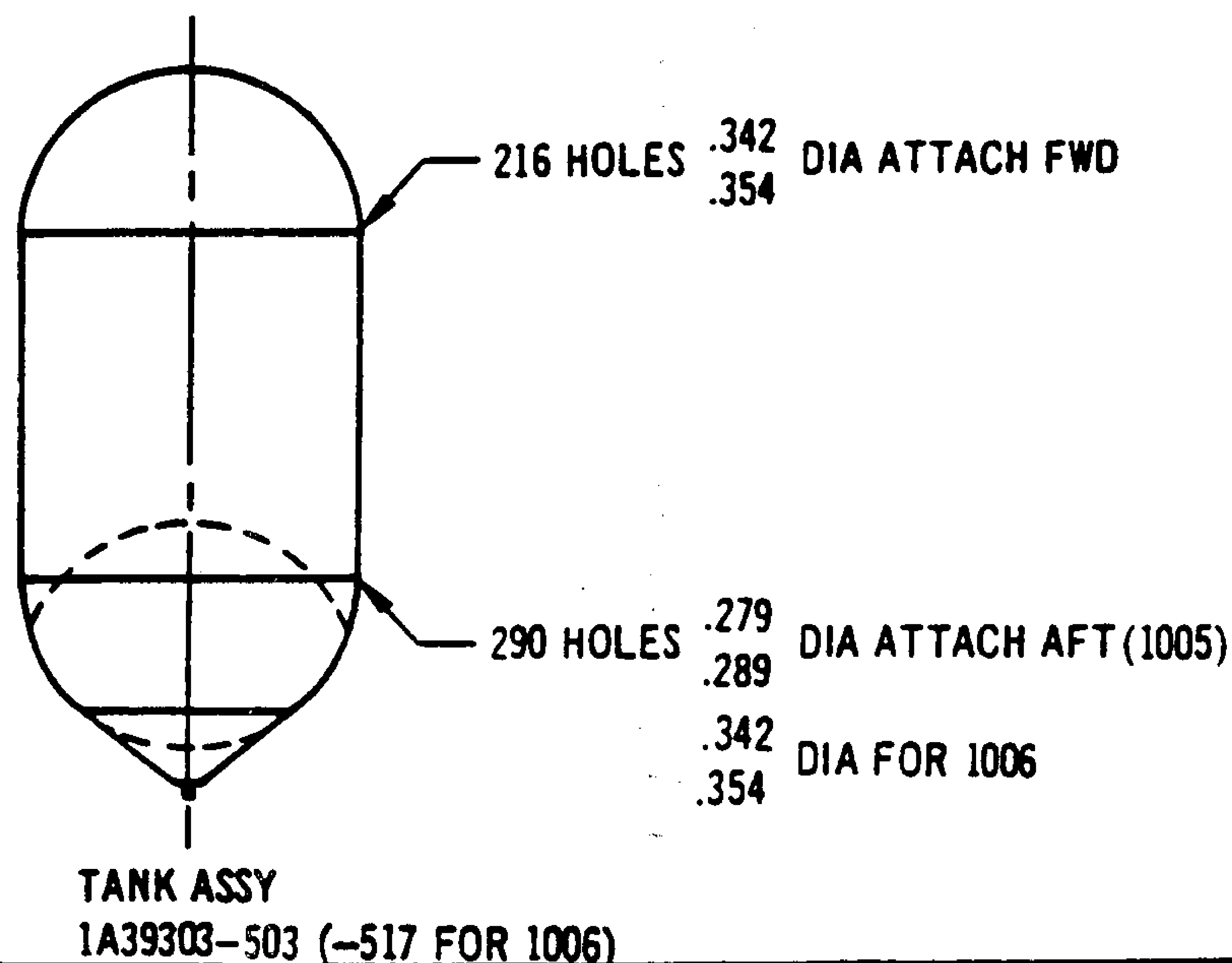
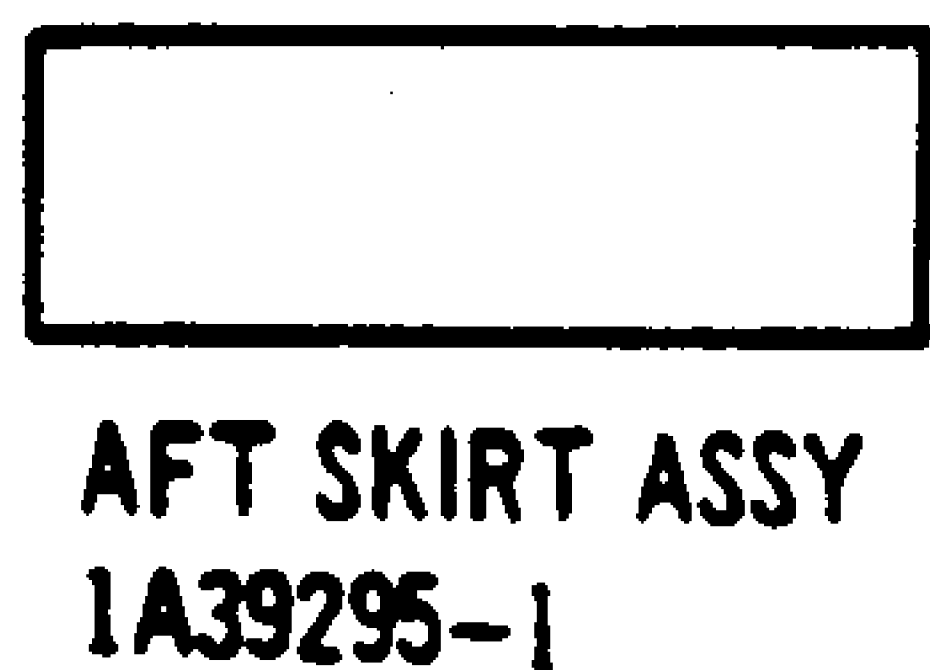
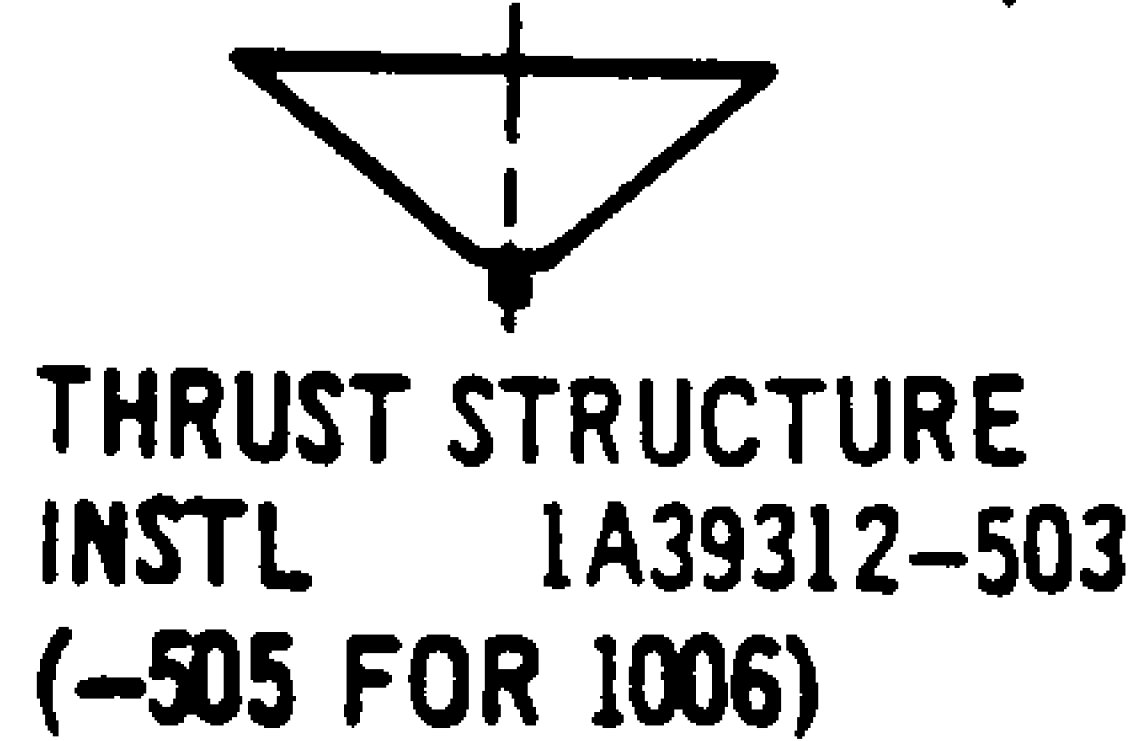
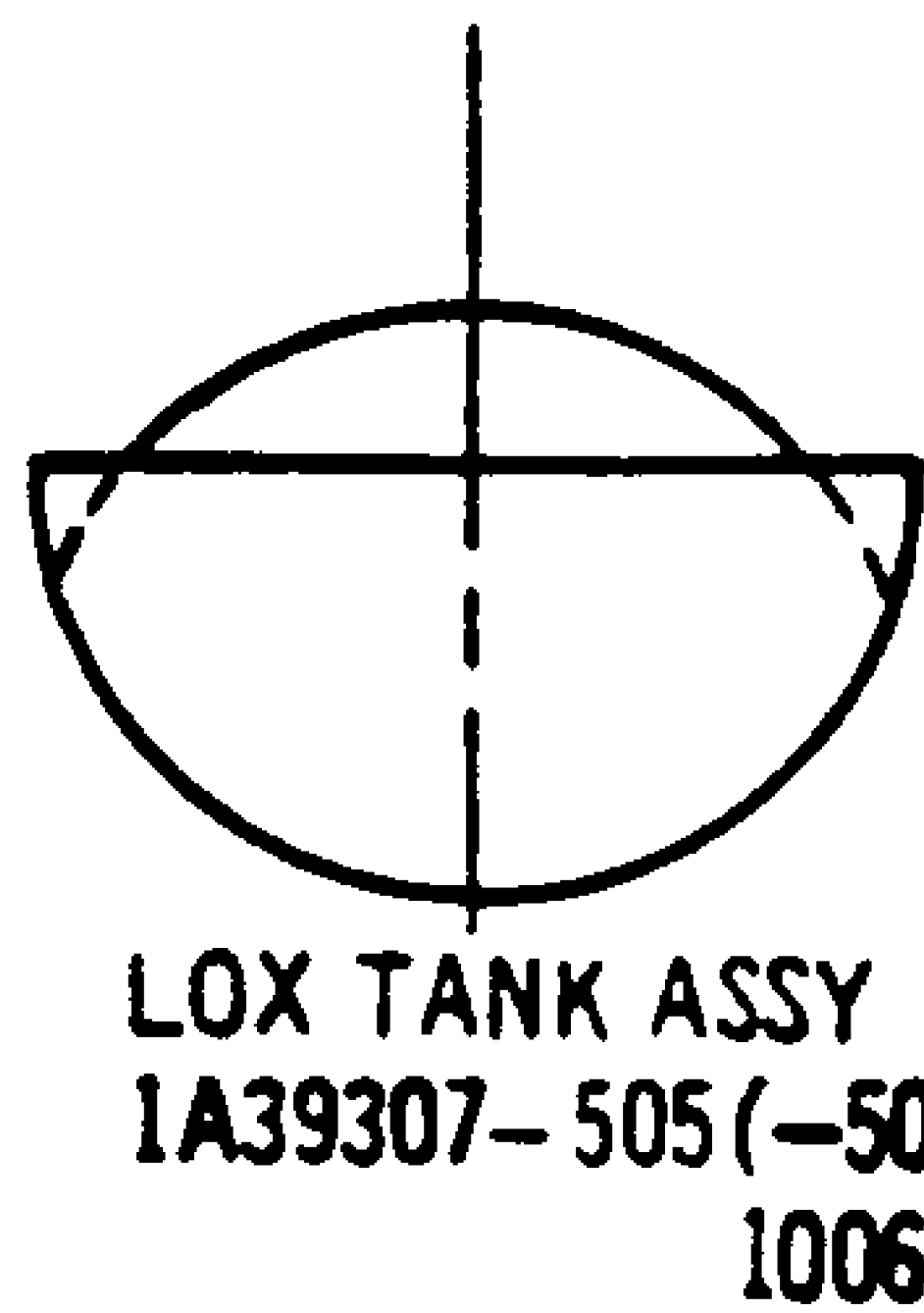
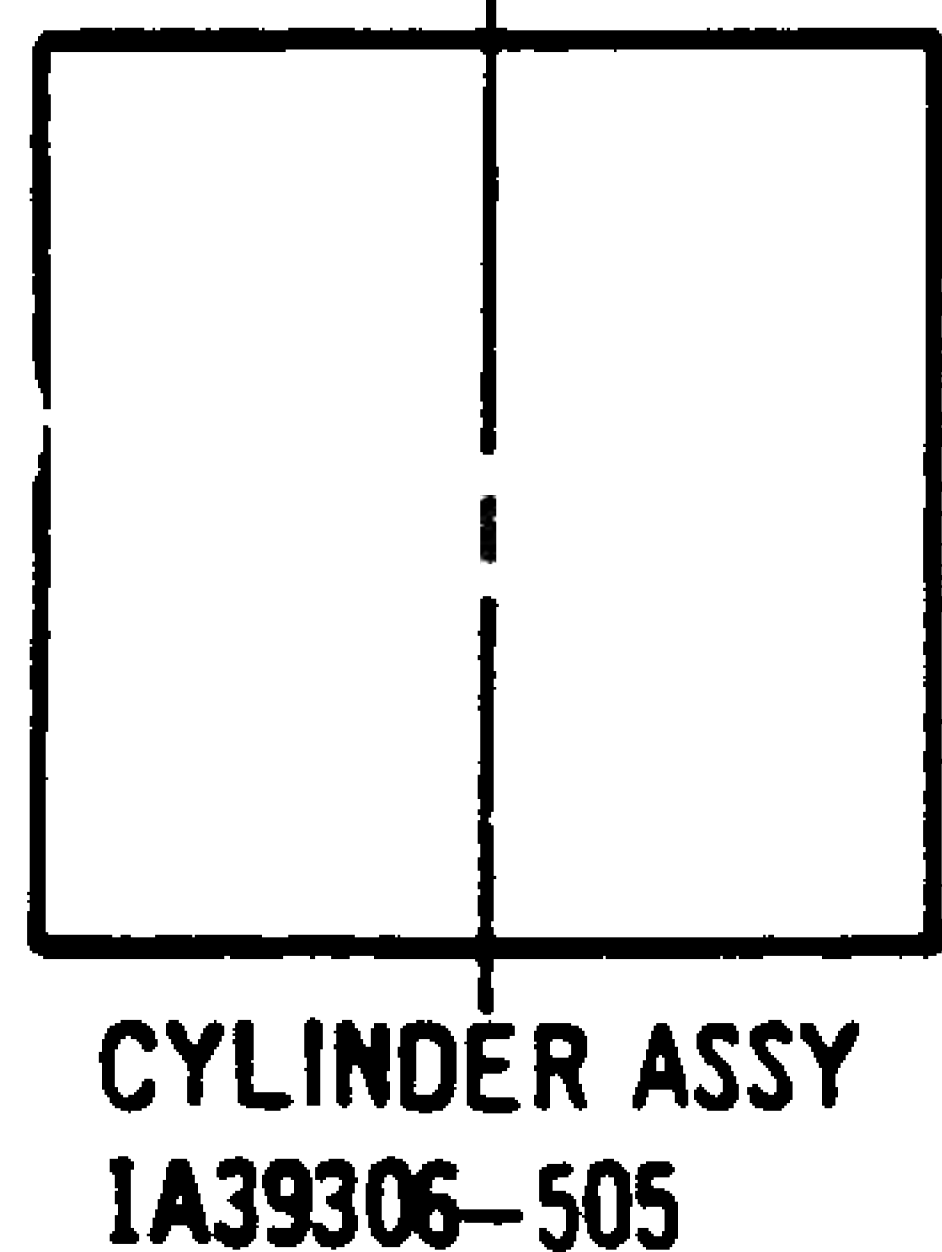
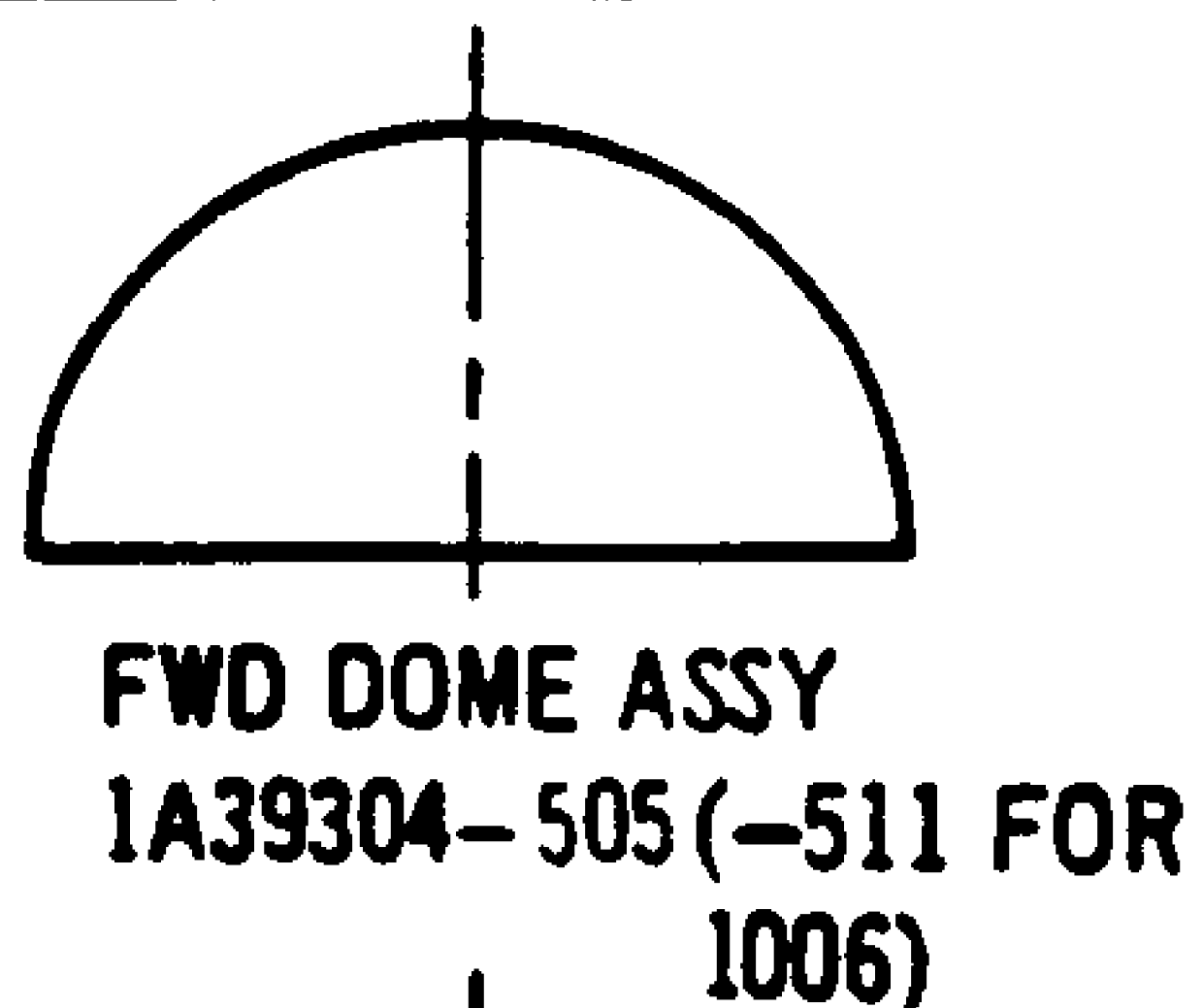
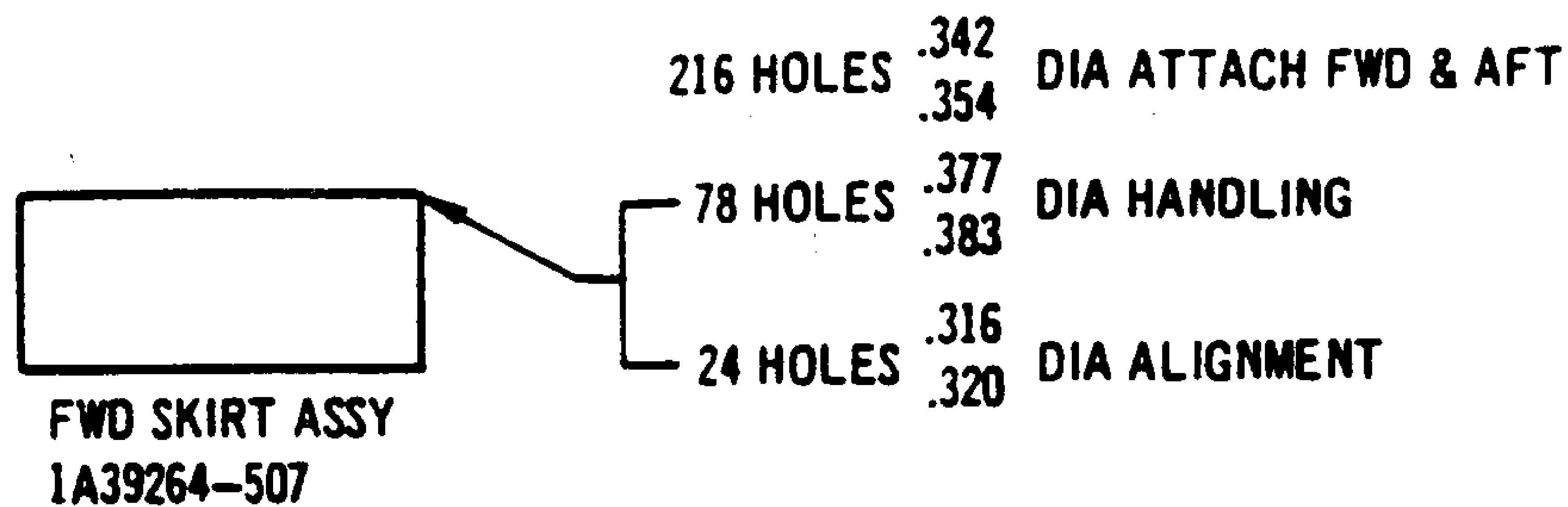
AFT SKIRT ASSY  
1A78302-505  
1B57963

290 HOLES .279 DIA ATTACH FWD  
.289

288 HOLES .343 DIA ATTACH AFT  
.352

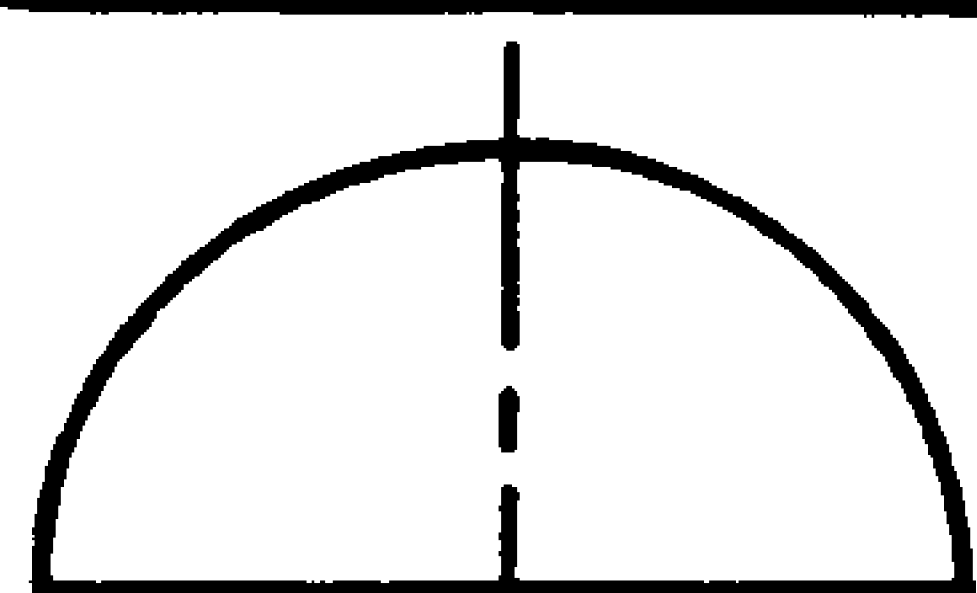
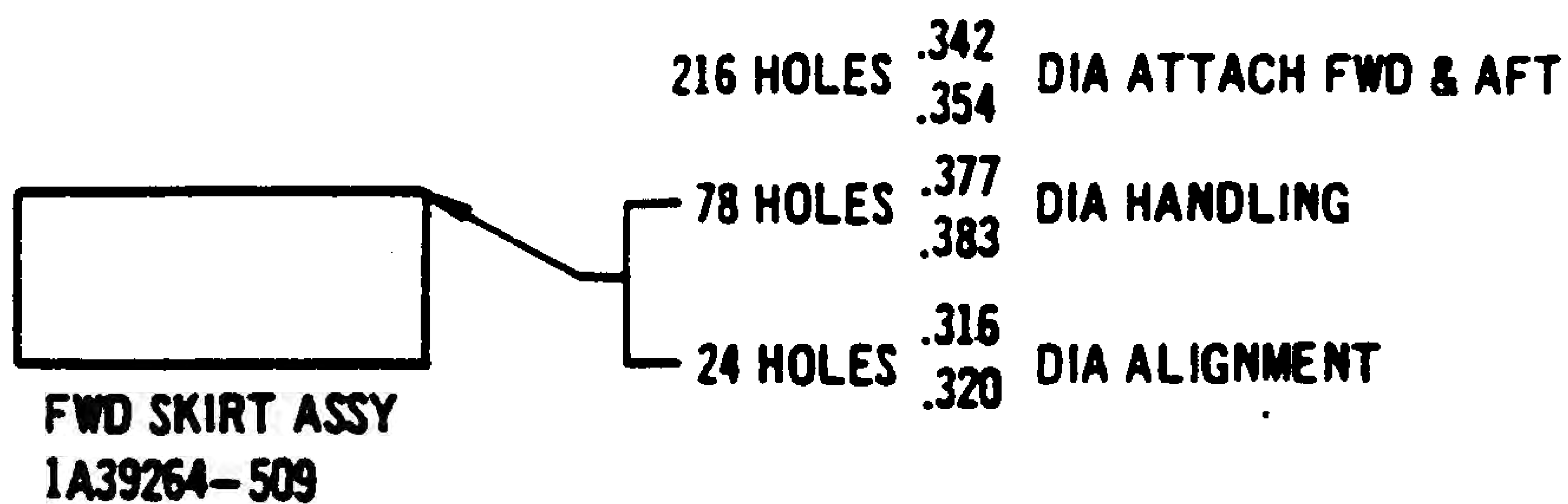
FACILITY CHECKOUT STAGE (1004)



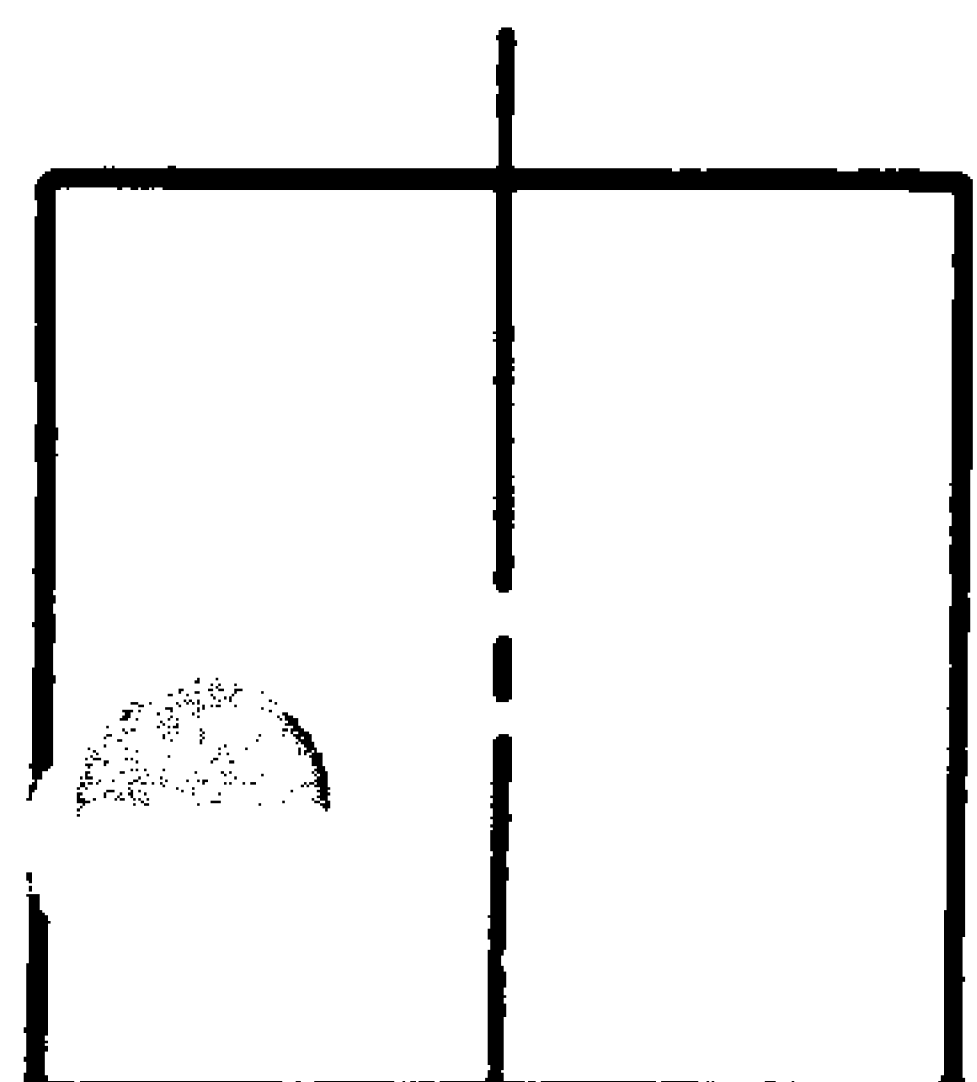


FLIGHT STAGES (1005 & 1006)

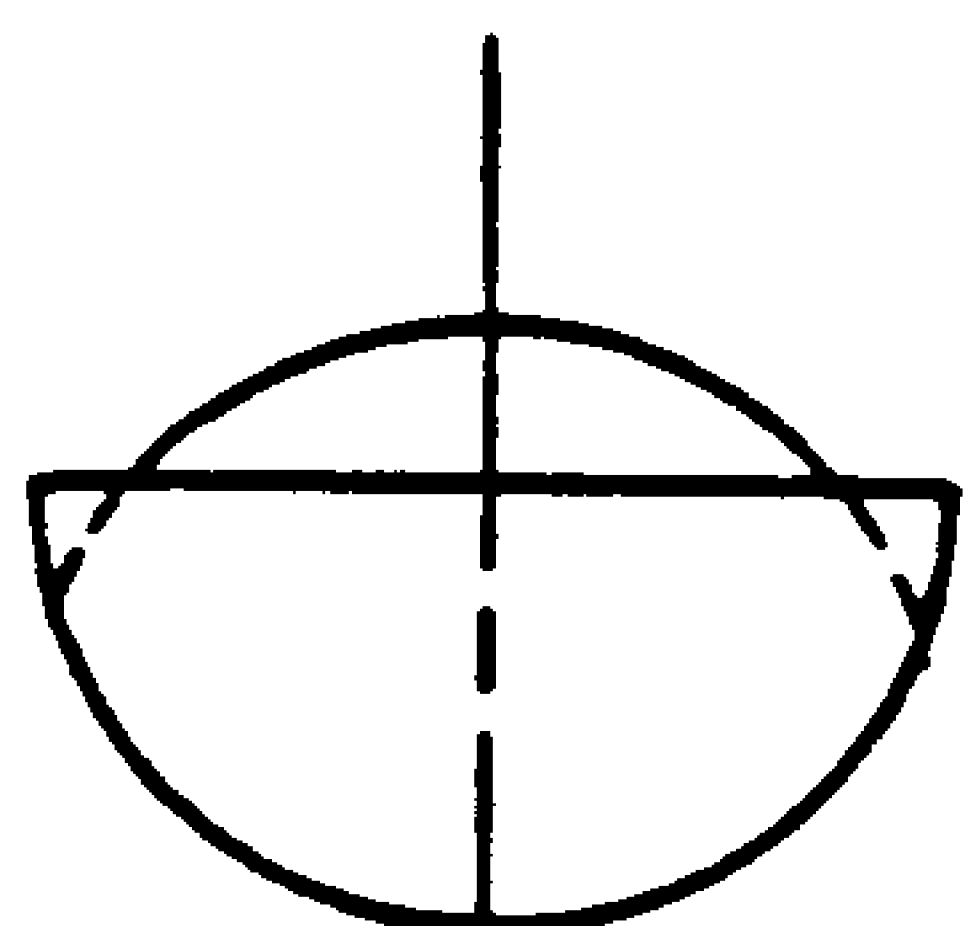




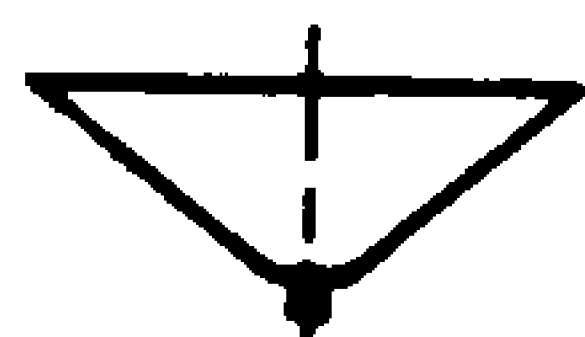
FWD DOME ASSY  
1A39304-509



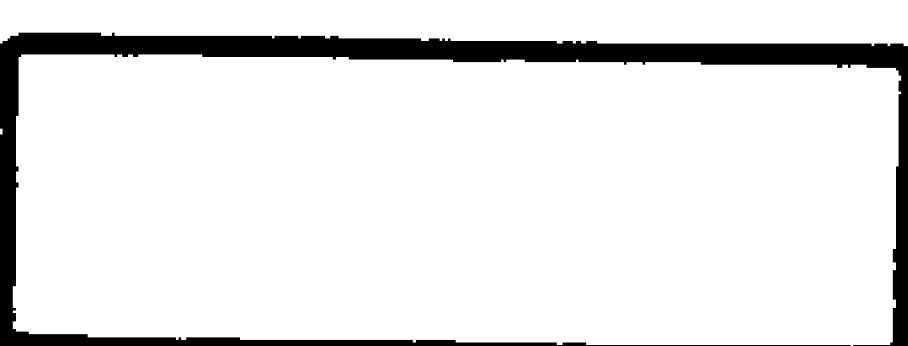
CYLINDER ASSY  
1A39306-511



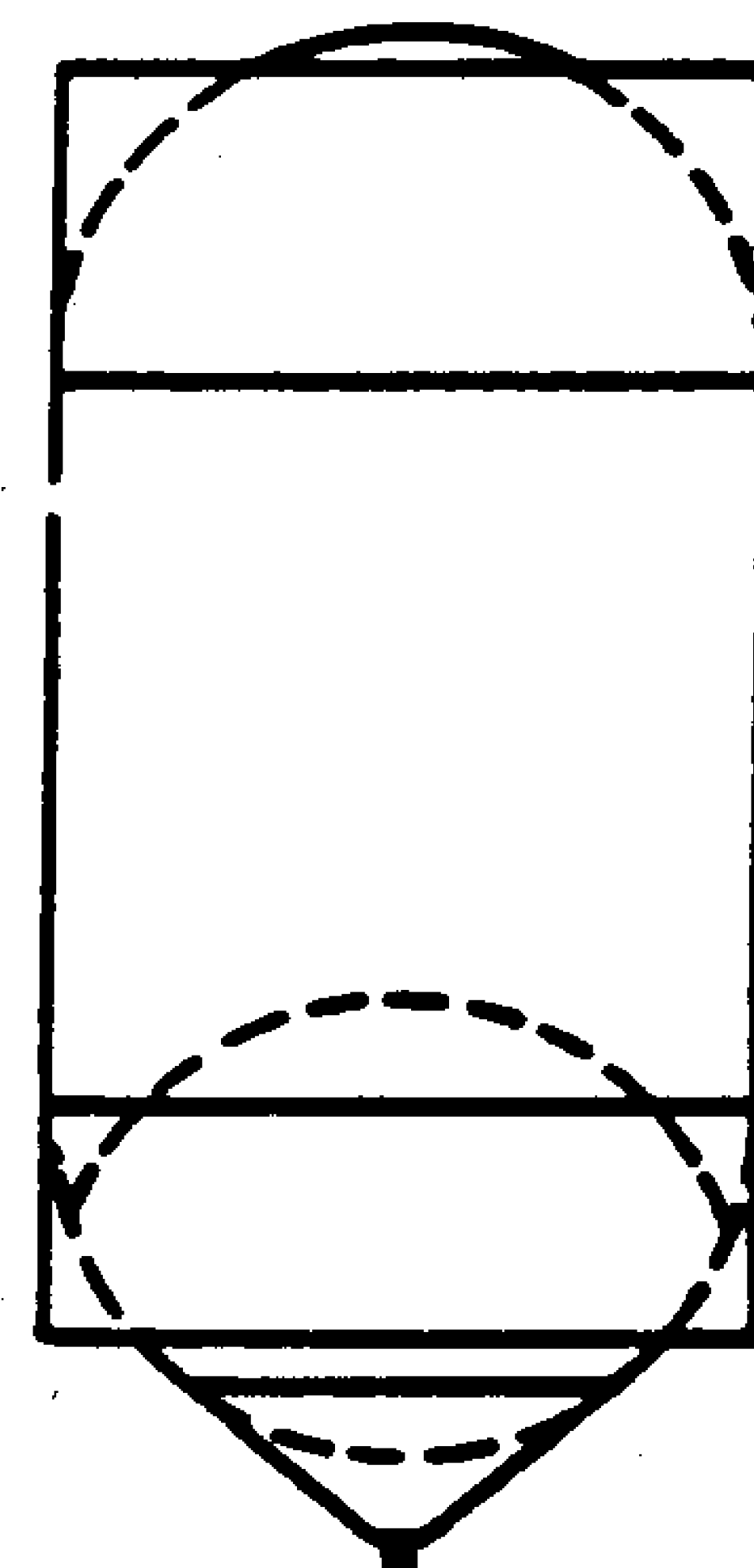
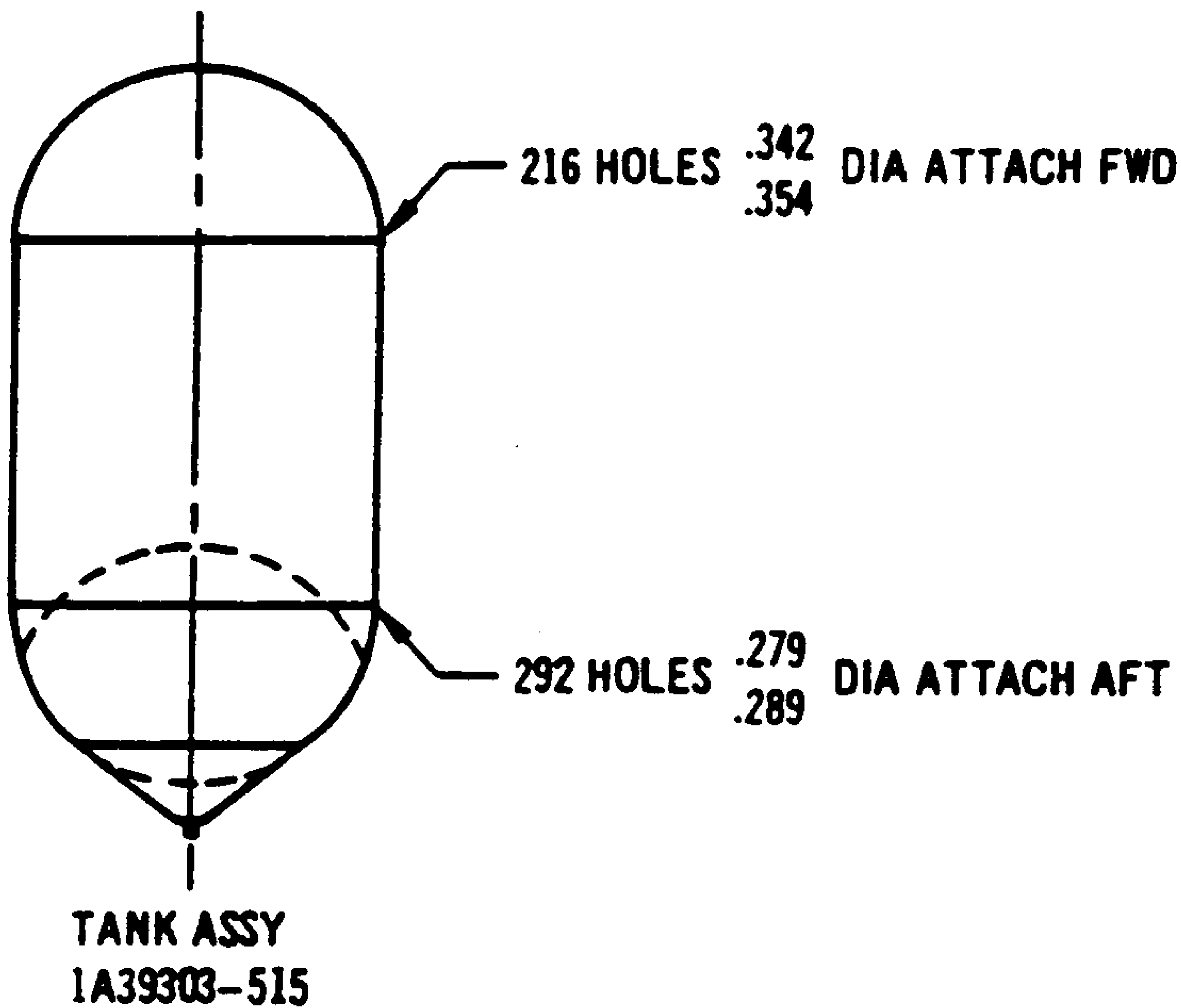
LOX TANK ASSY  
1A39307-513



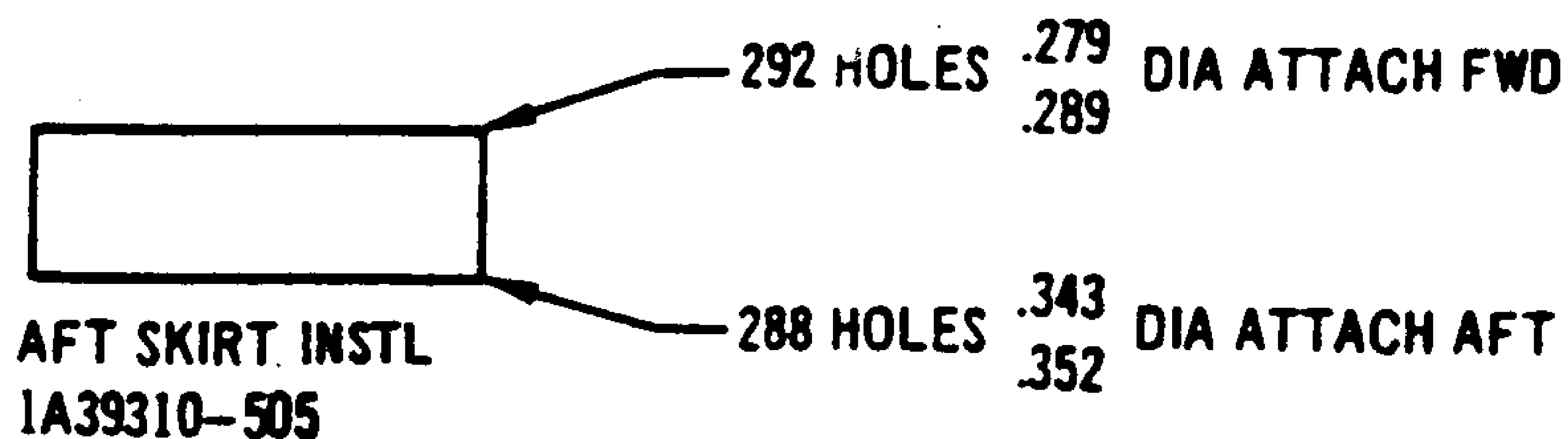
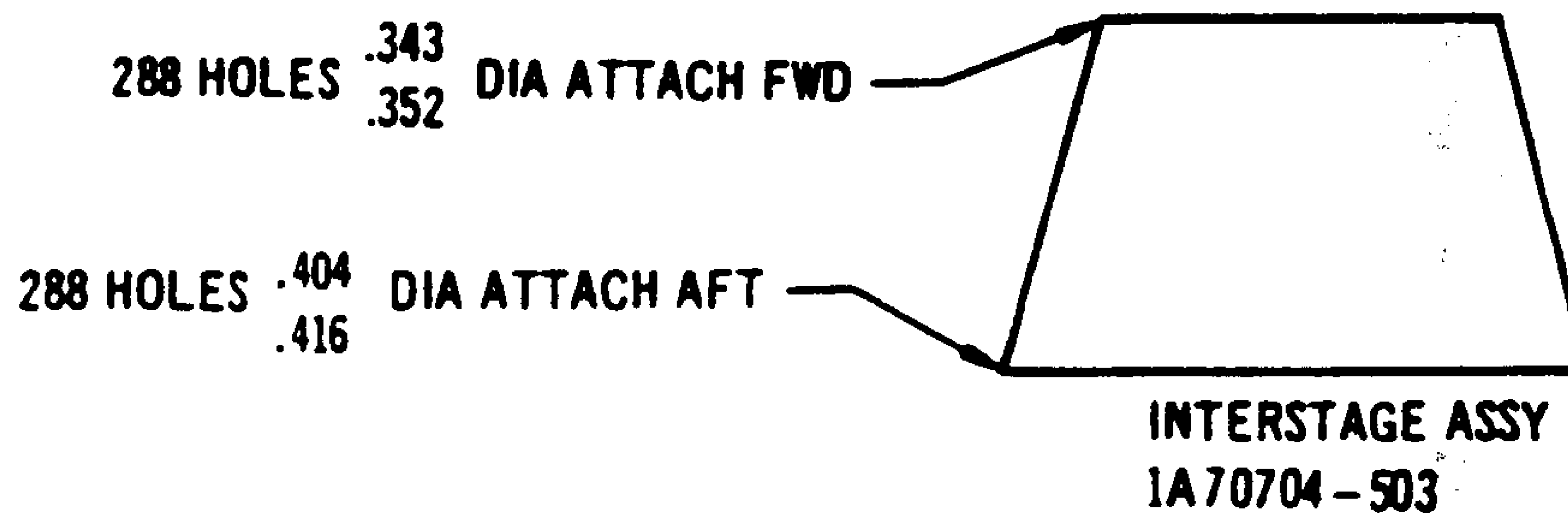
THRUST STRUCTURE  
INSTL 1A39312-509



SKIRT ASSY  
1A39295-505

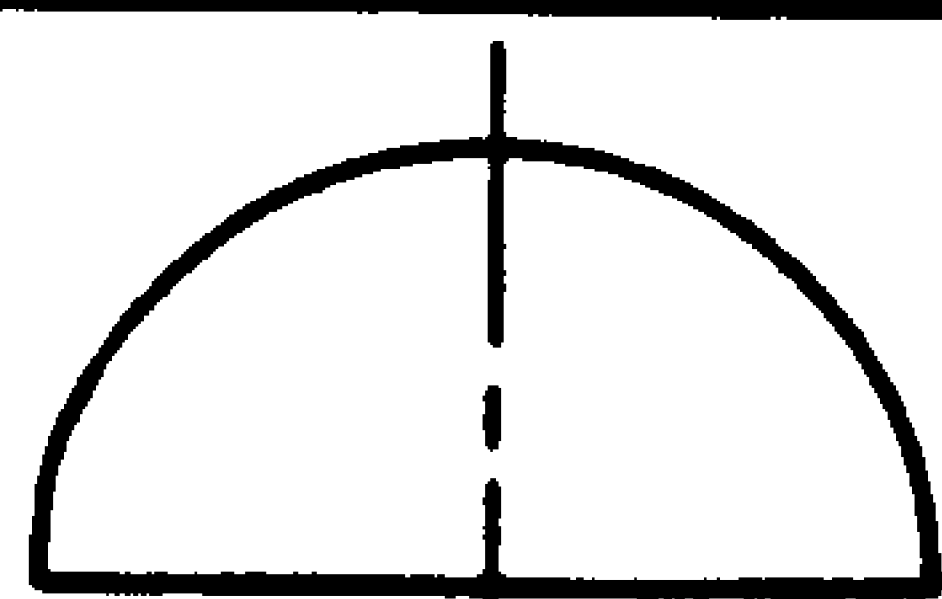
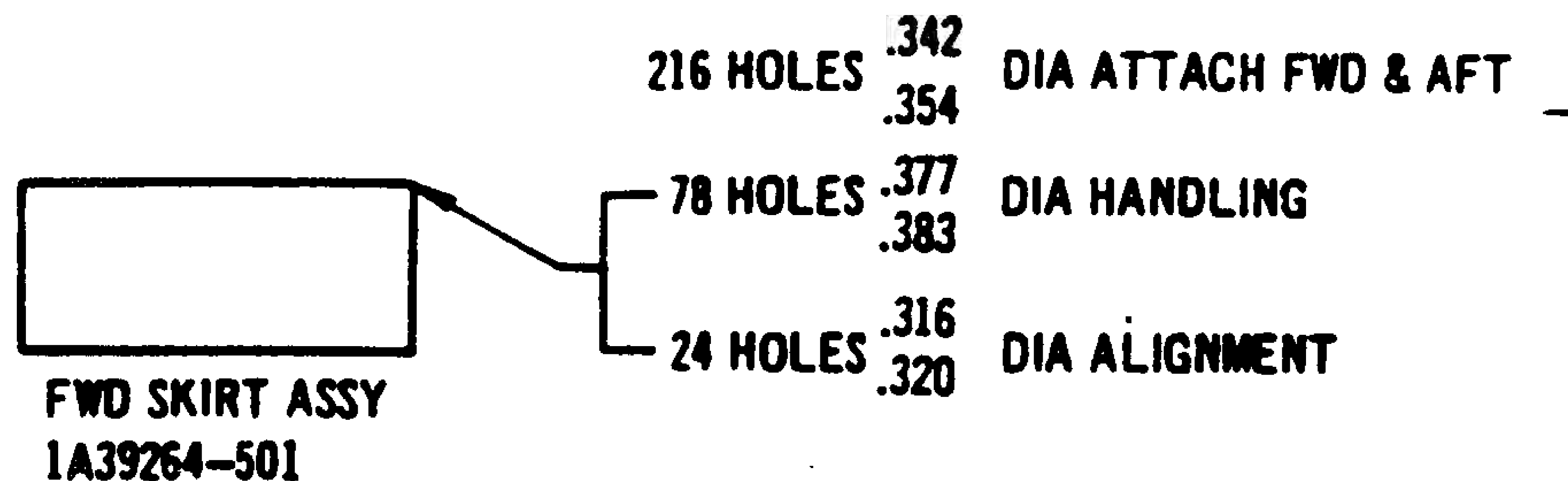


STRUCTURAL ASSY  
1A39301-509

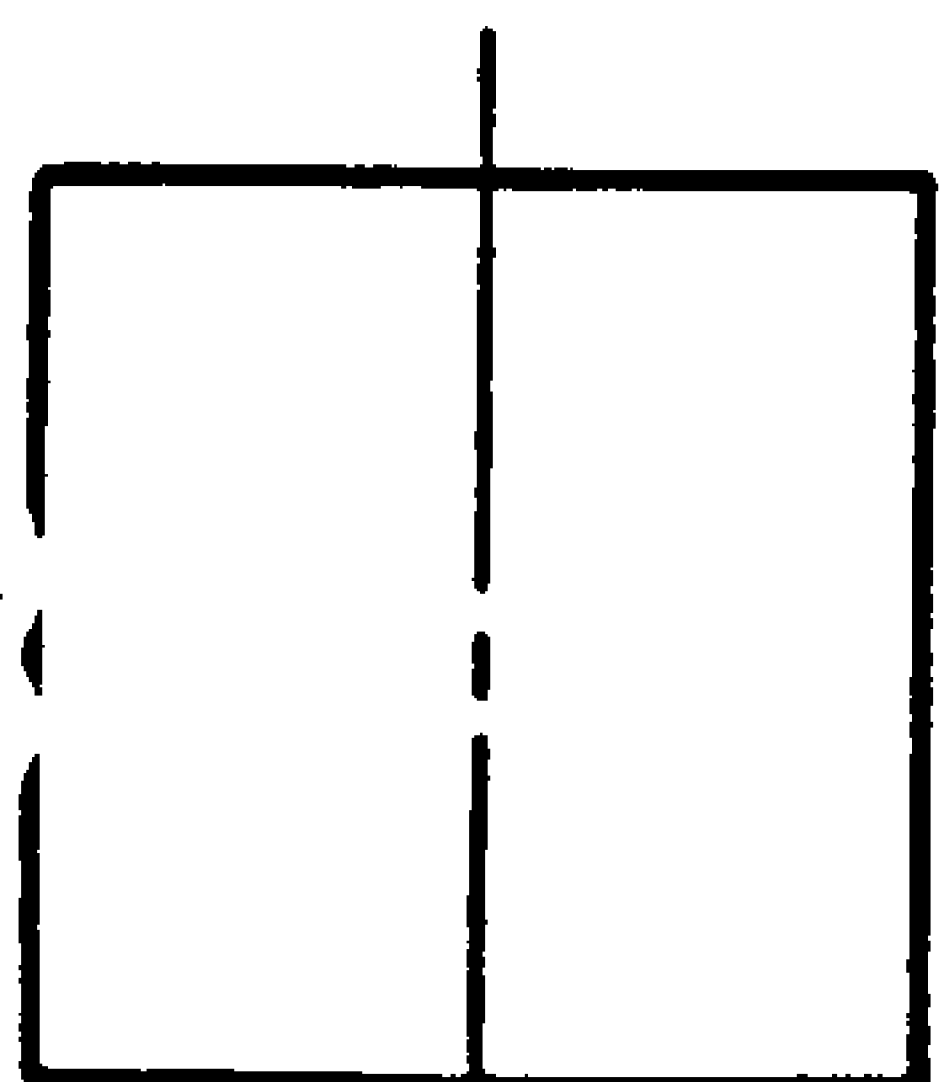


FLIGHT STAGE (1007)

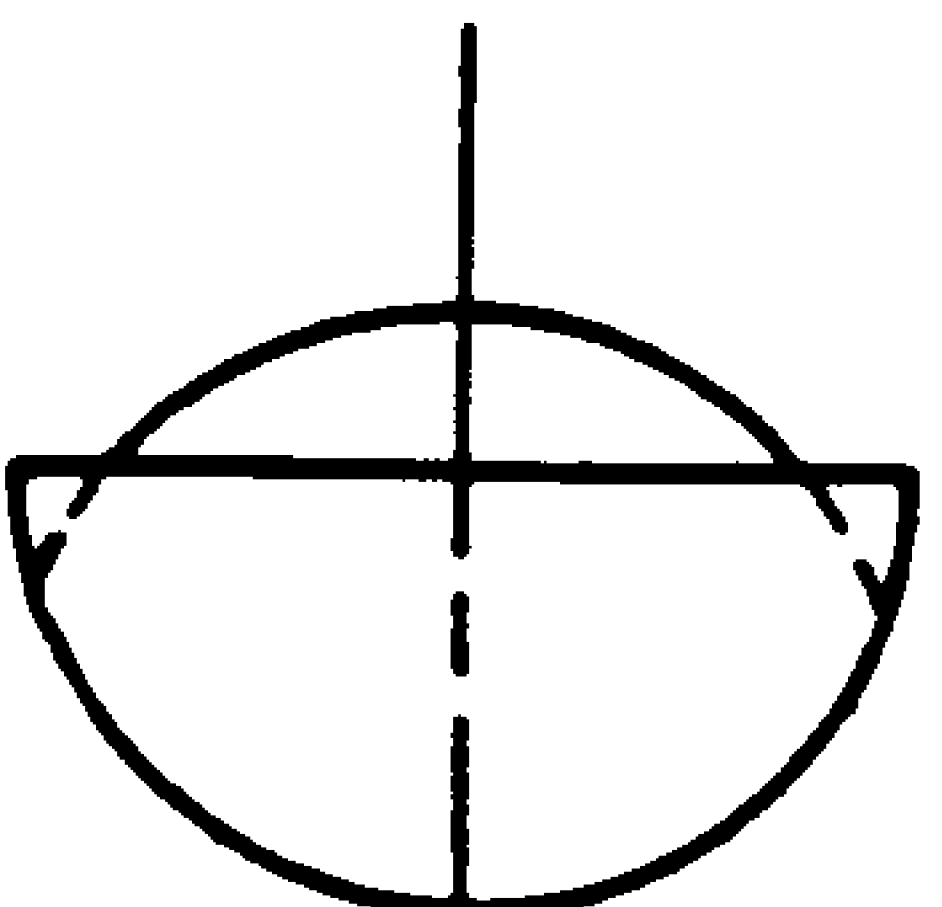




FWD DOME ASSY  
1A39304-515



CYLINDER ASSY  
1A39306-511

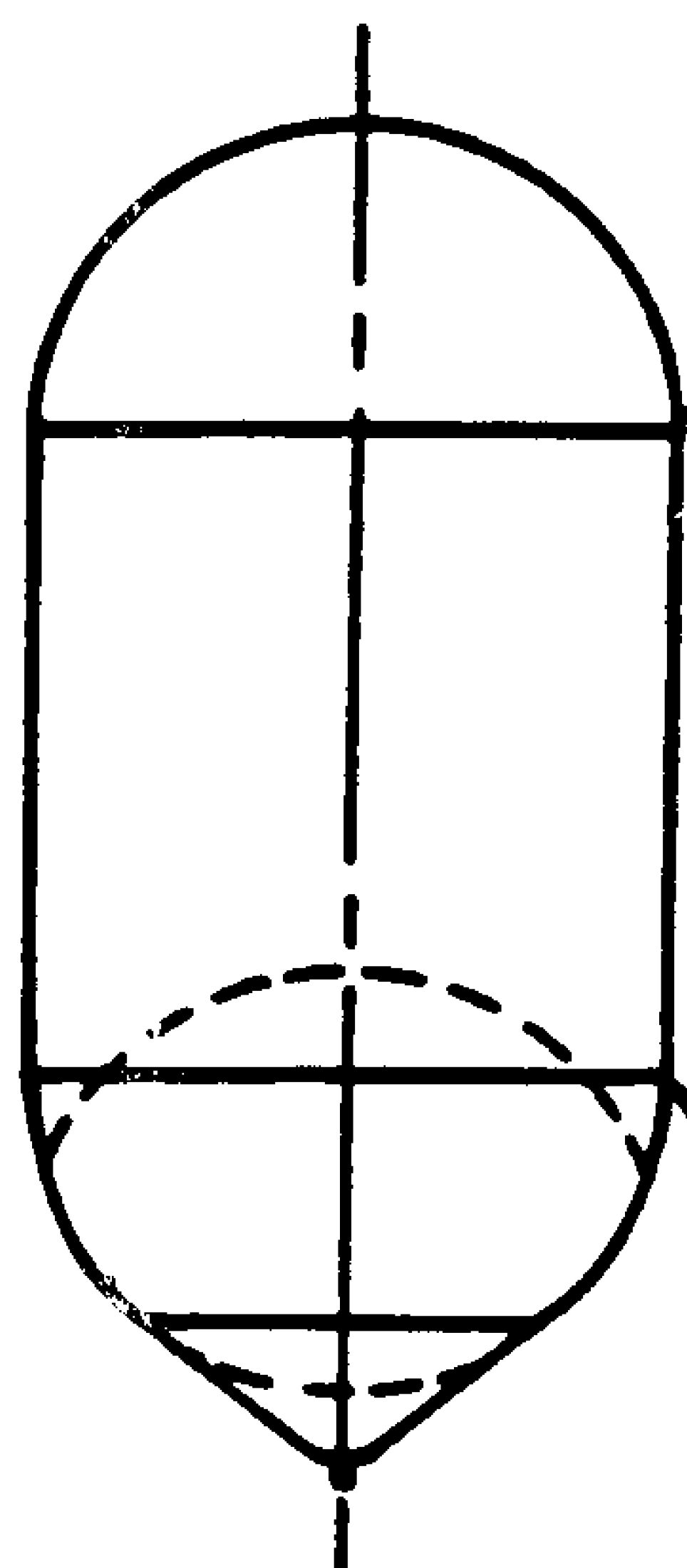


LOX TANK ASSY  
1A39307-525

THRUST STRUCTURE  
INSTL 1A39312-509



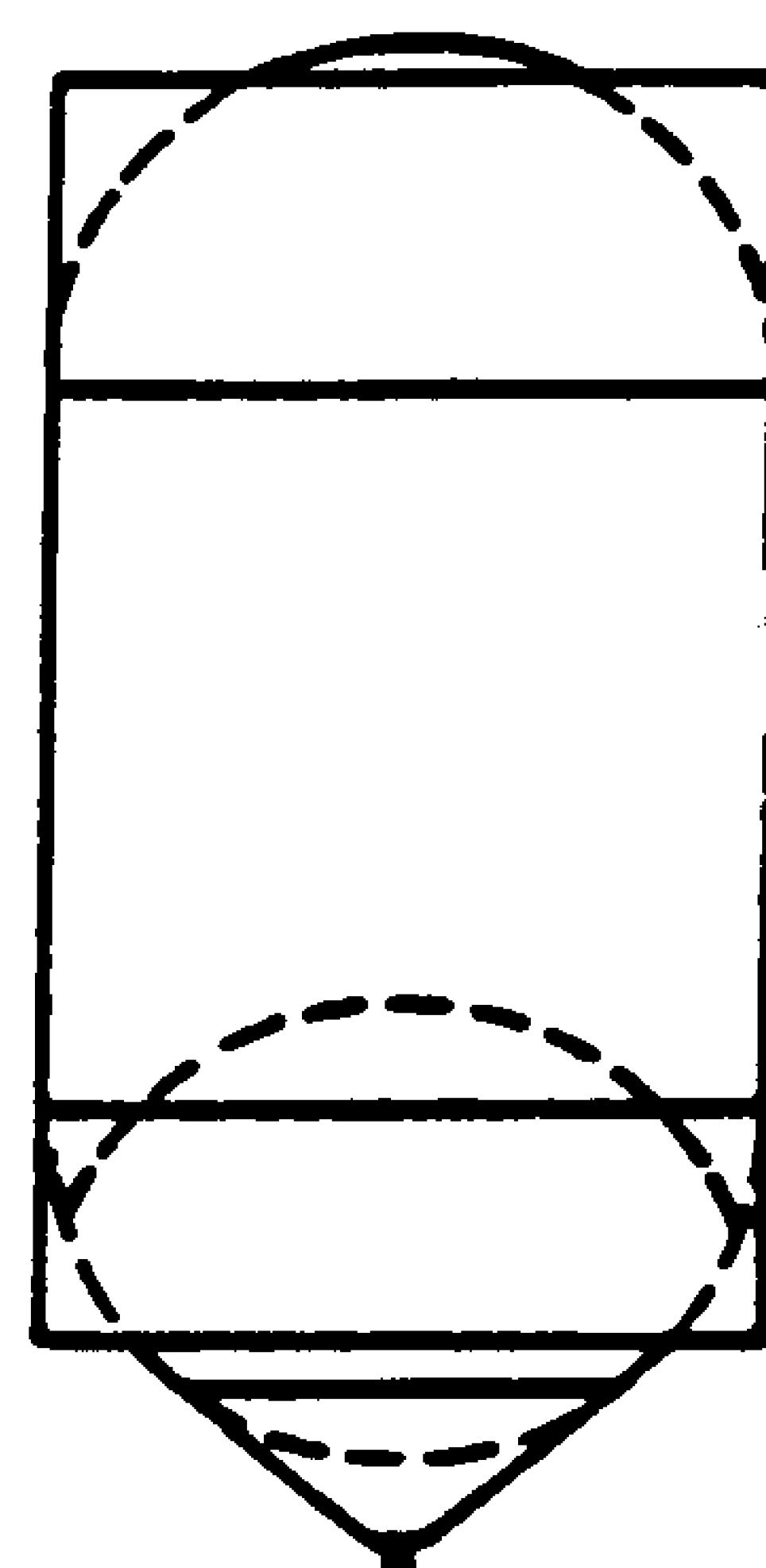
AFT SKIRT ASSY  
1A39295-509



TANK ASSY  
1A39303-521

216 HOLES .342 DIA ATTACH FWD  
.354

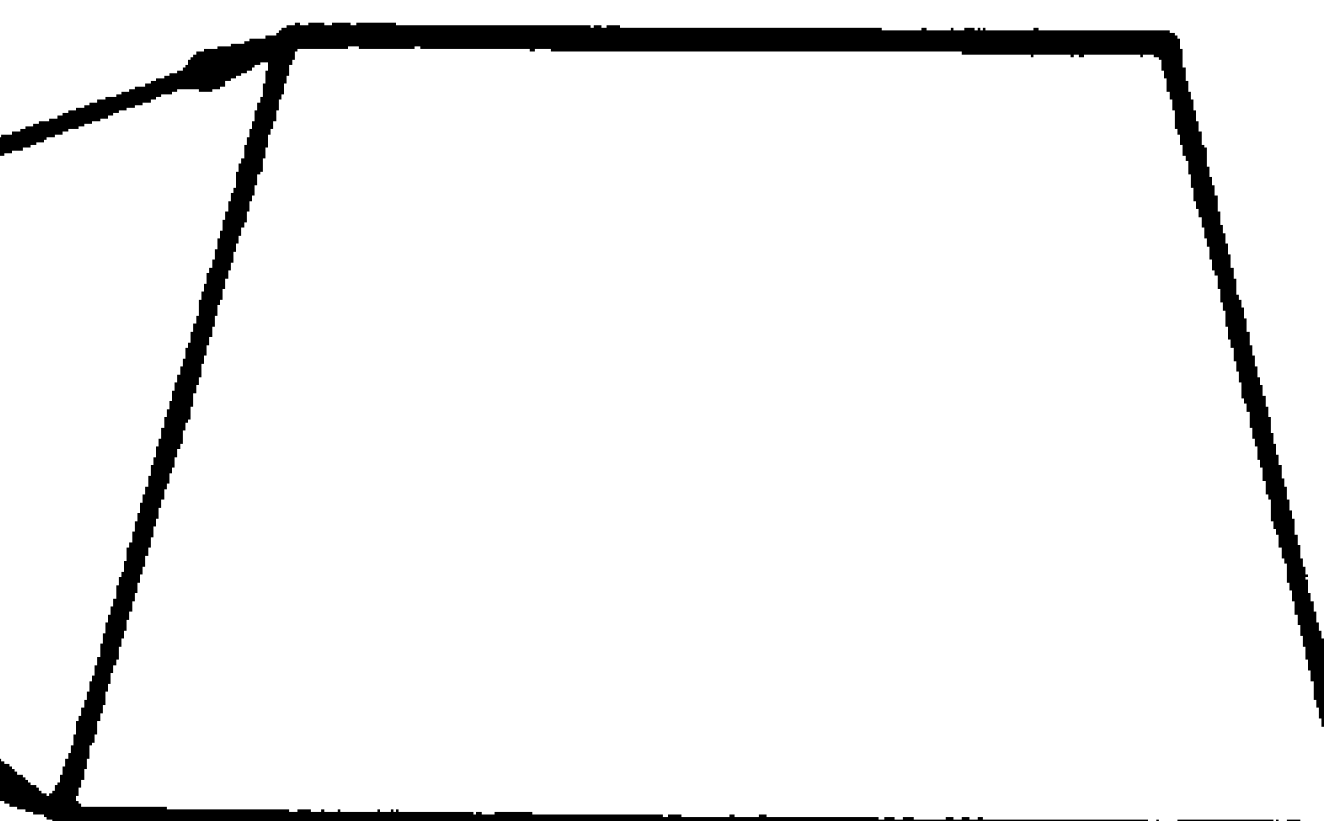
292 HOLES .279 DIA ATTACH AFT  
.289



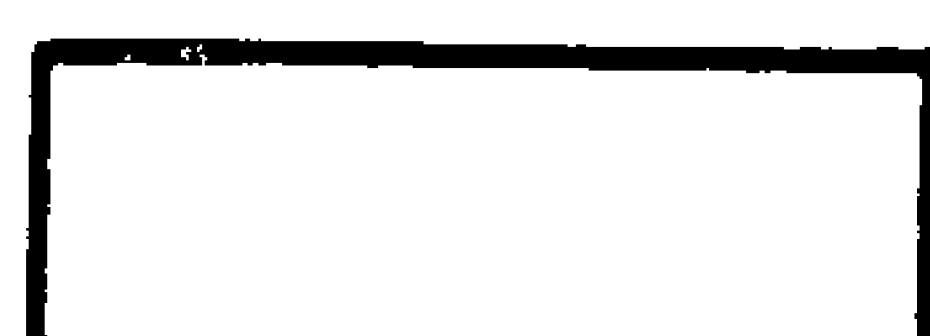
STRUCTURAL ASSY  
1A39301-505

288 HOLES .343 DIA ATTACH FWD  
.352

288 HOLES .404 DIA ATTACH AFT  
.416



INTERSTAGE ASSY  
1A70704-503 (EFFECTIVITY STAGE 1007)



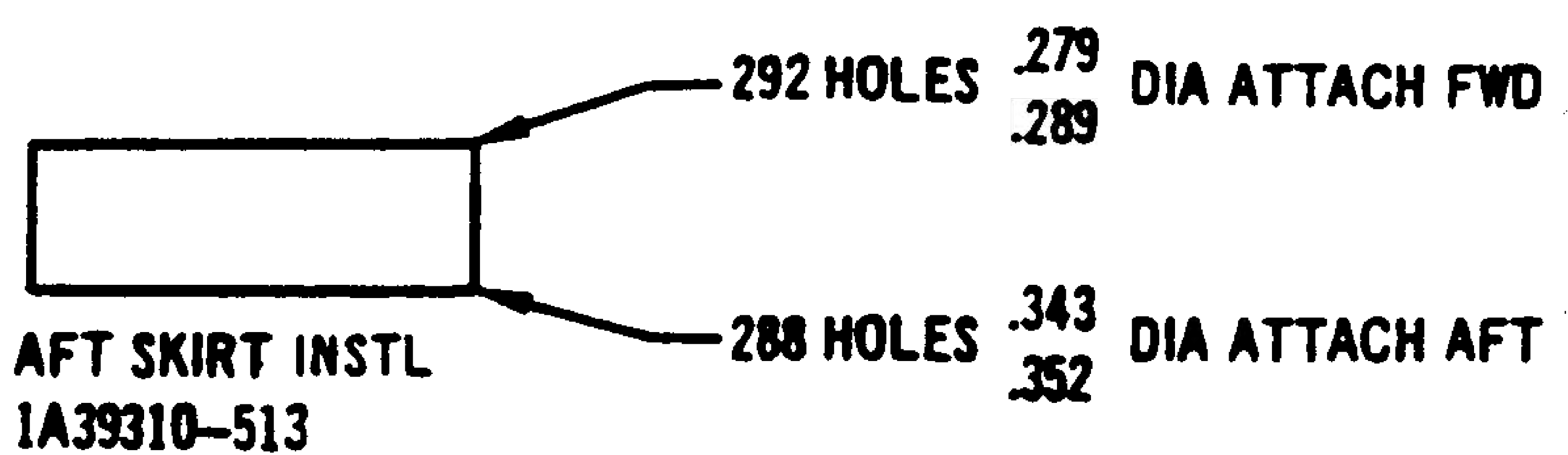
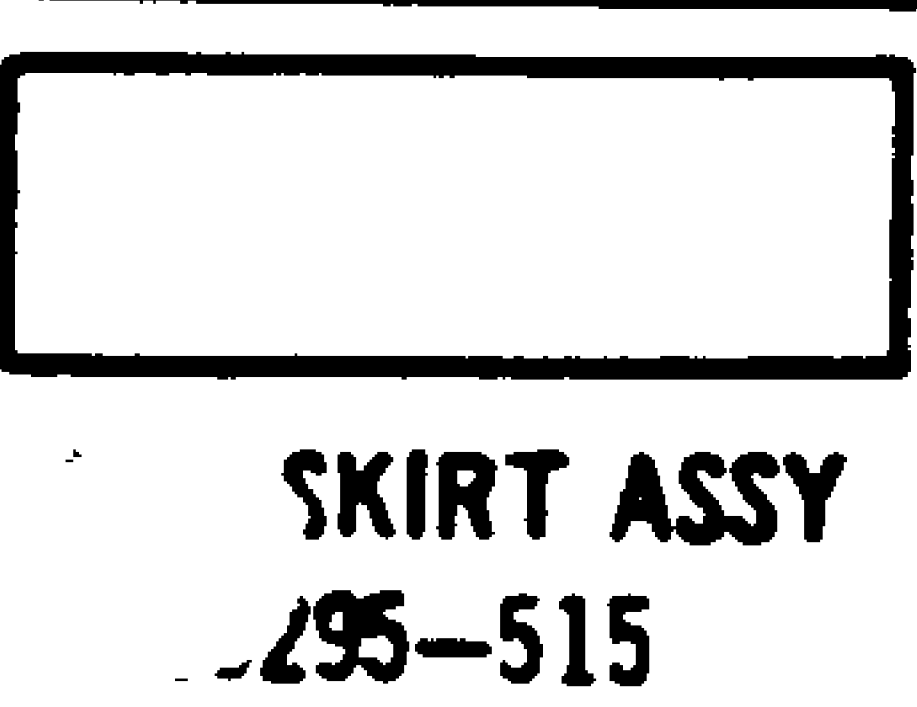
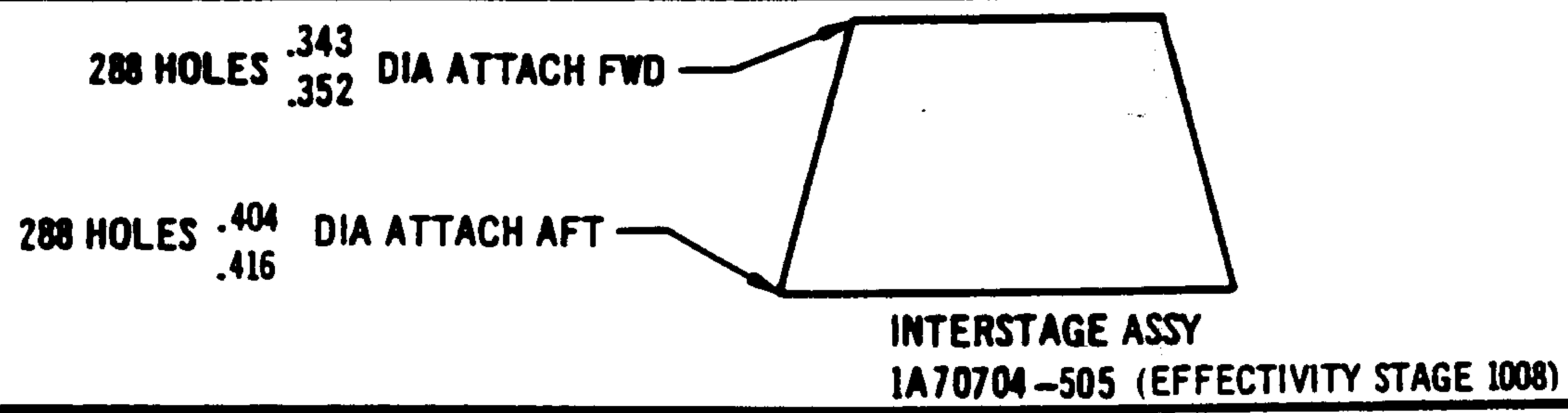
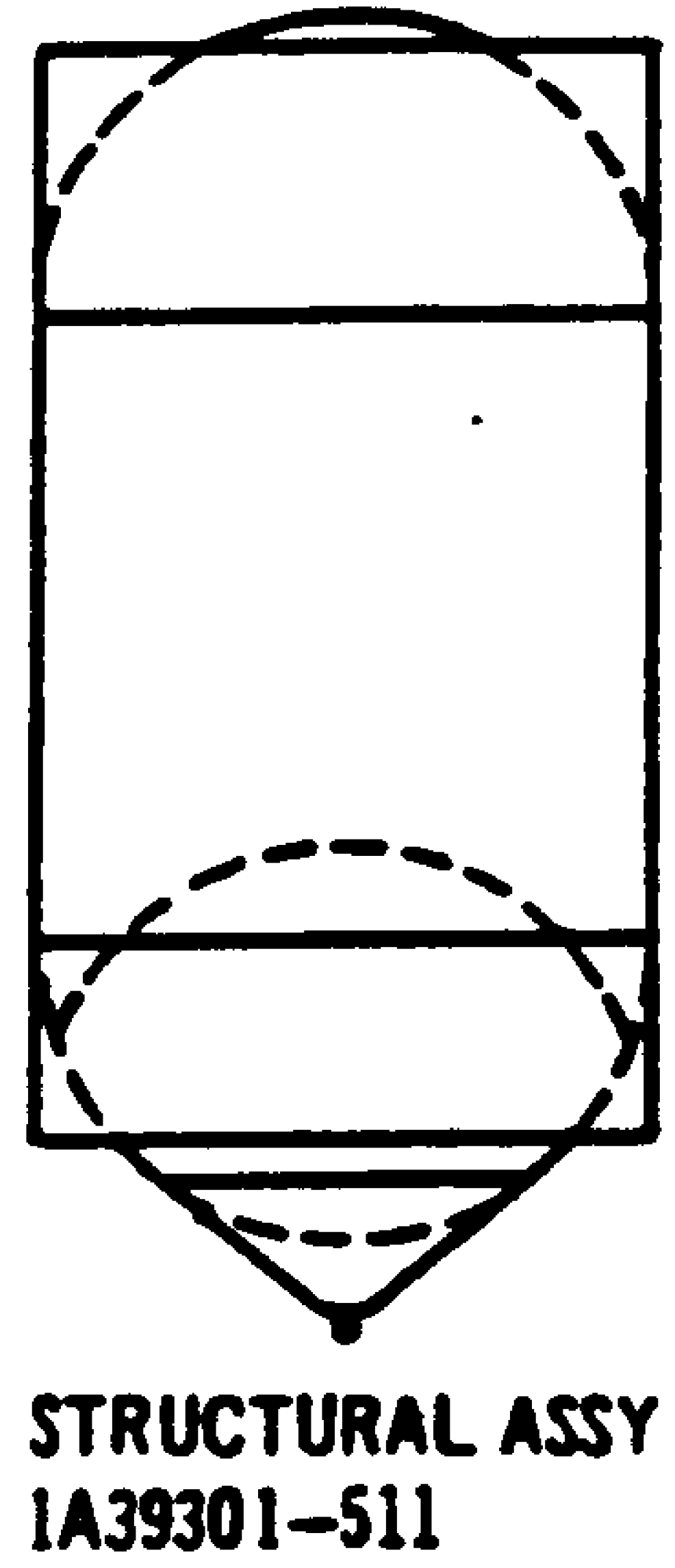
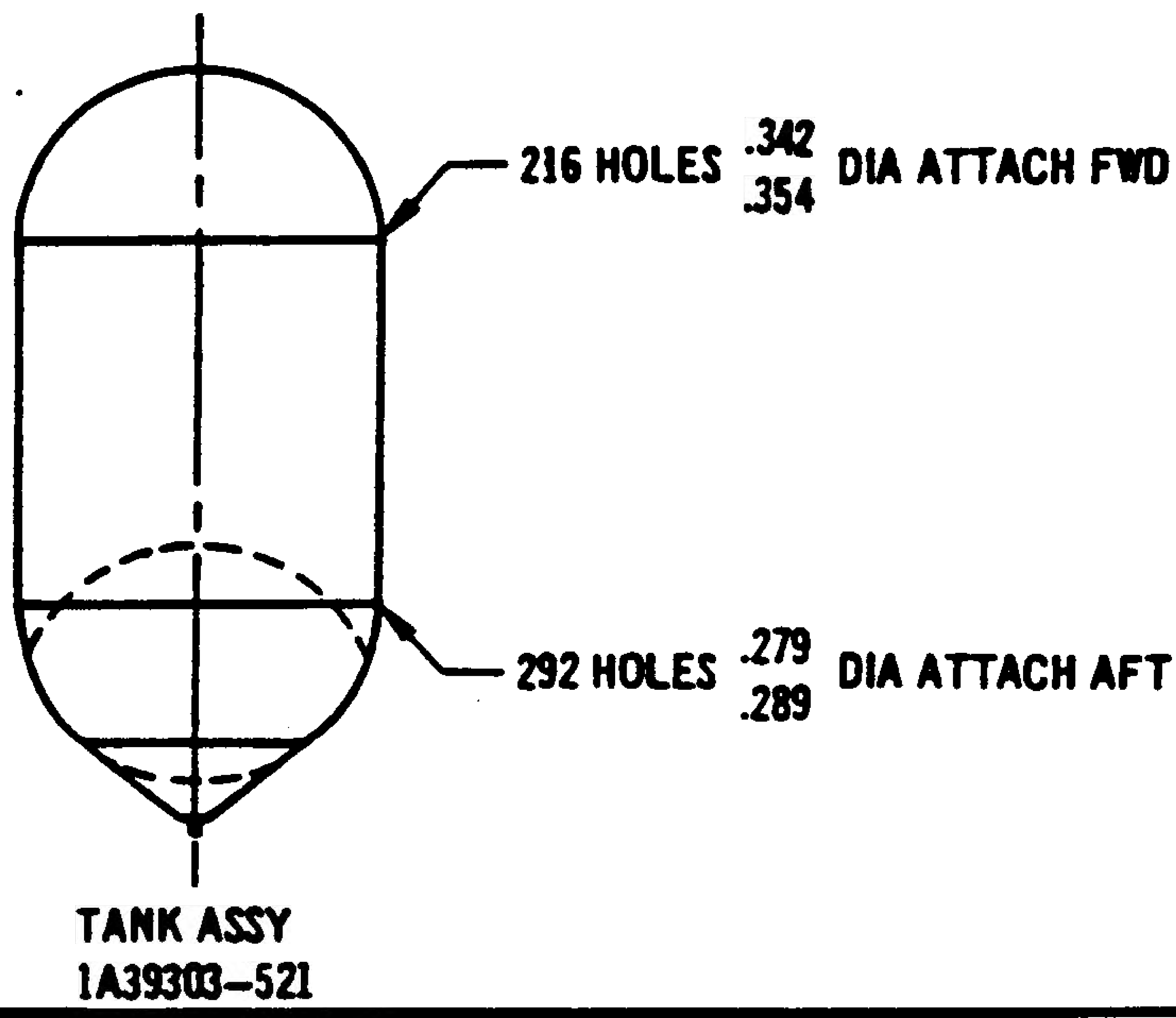
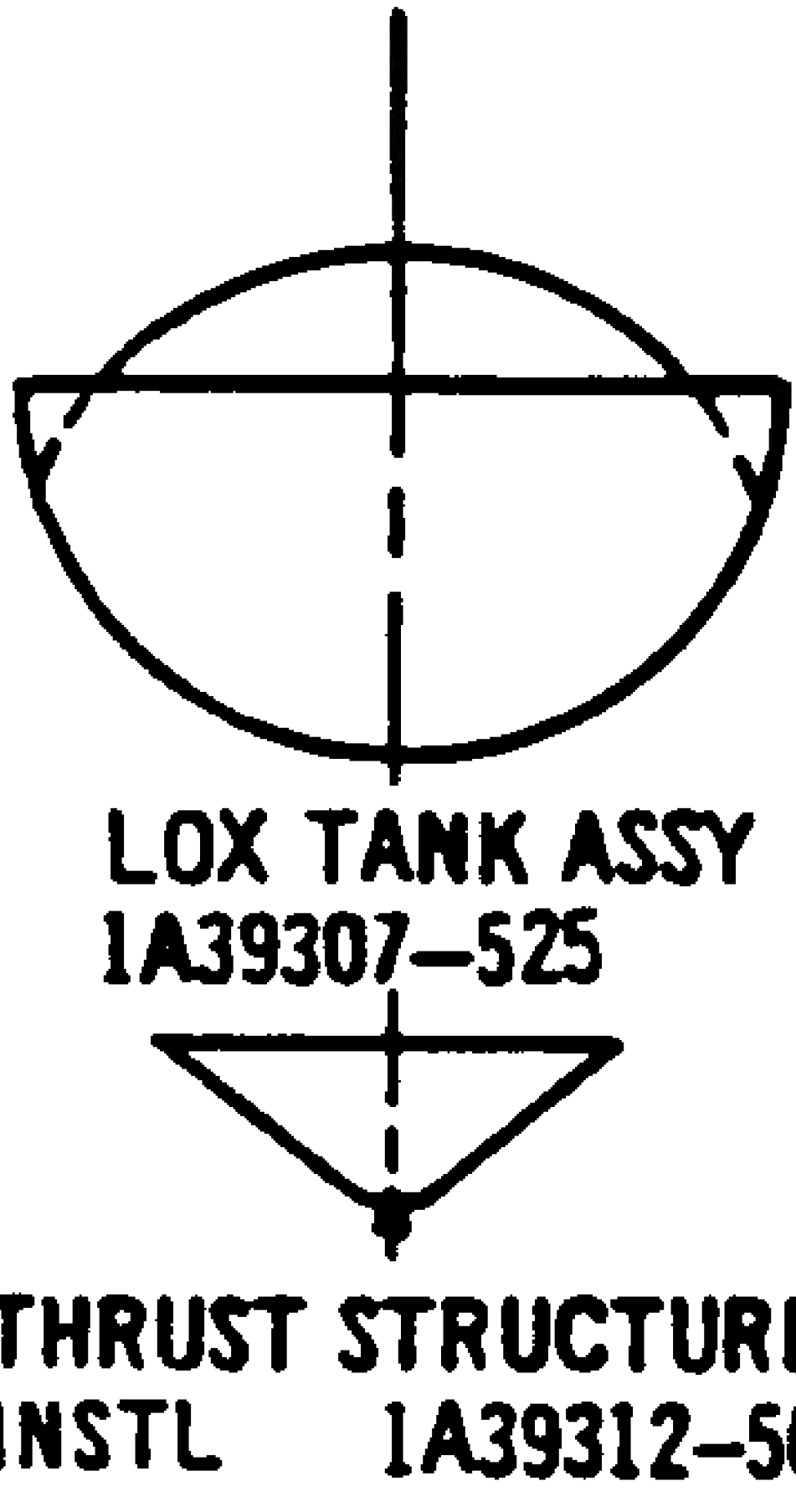
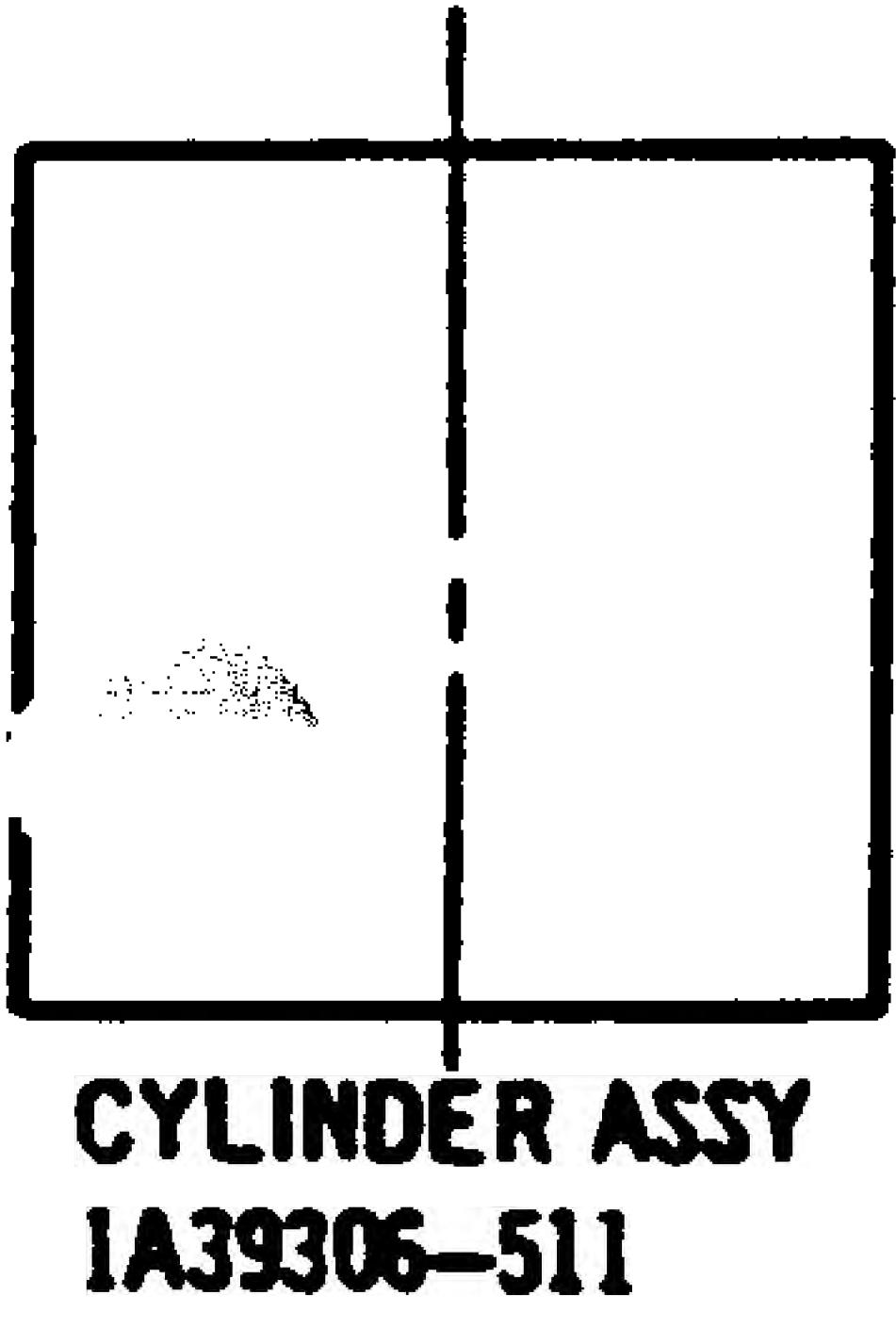
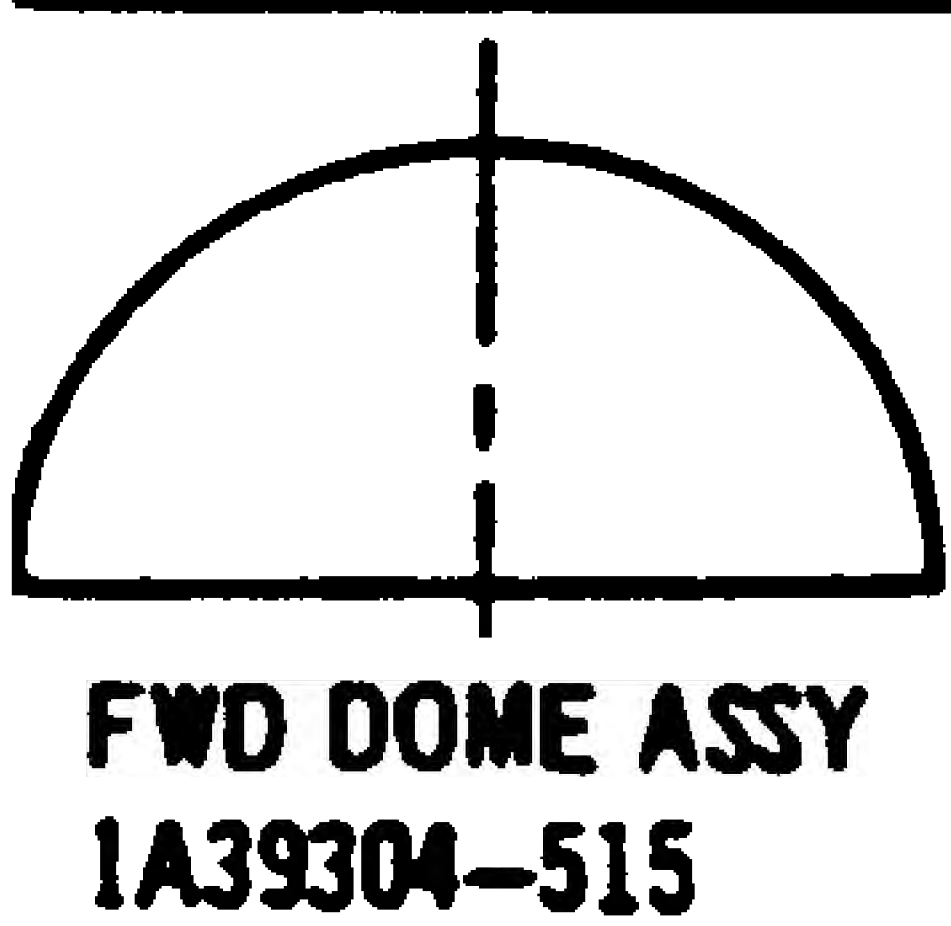
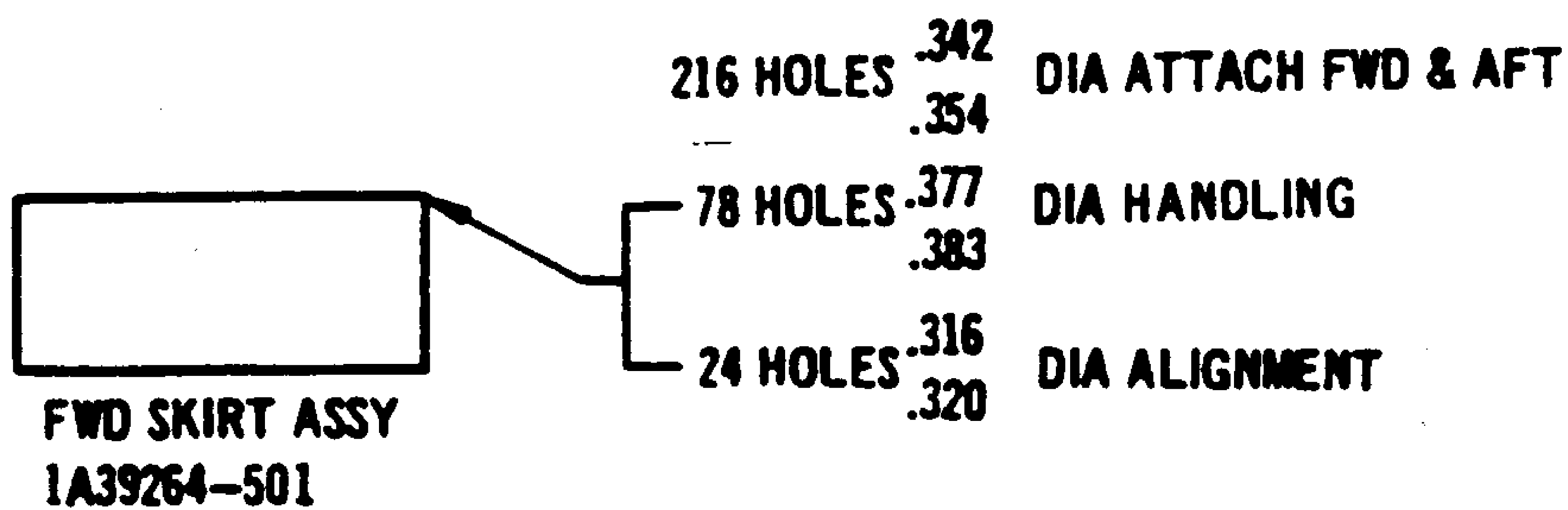
AFT SKIRT INSTL  
1A39310-507

292 HOLES .279 DIA ATTACH FWD  
.289

288 HOLES .343 DIA ATTACH AFT  
.352

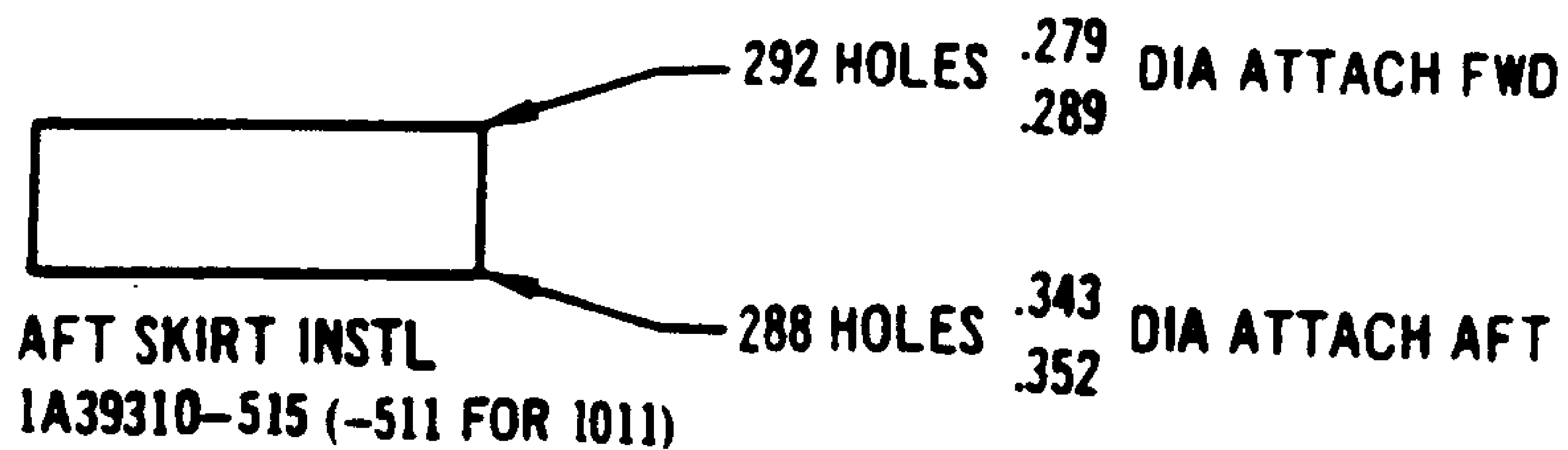
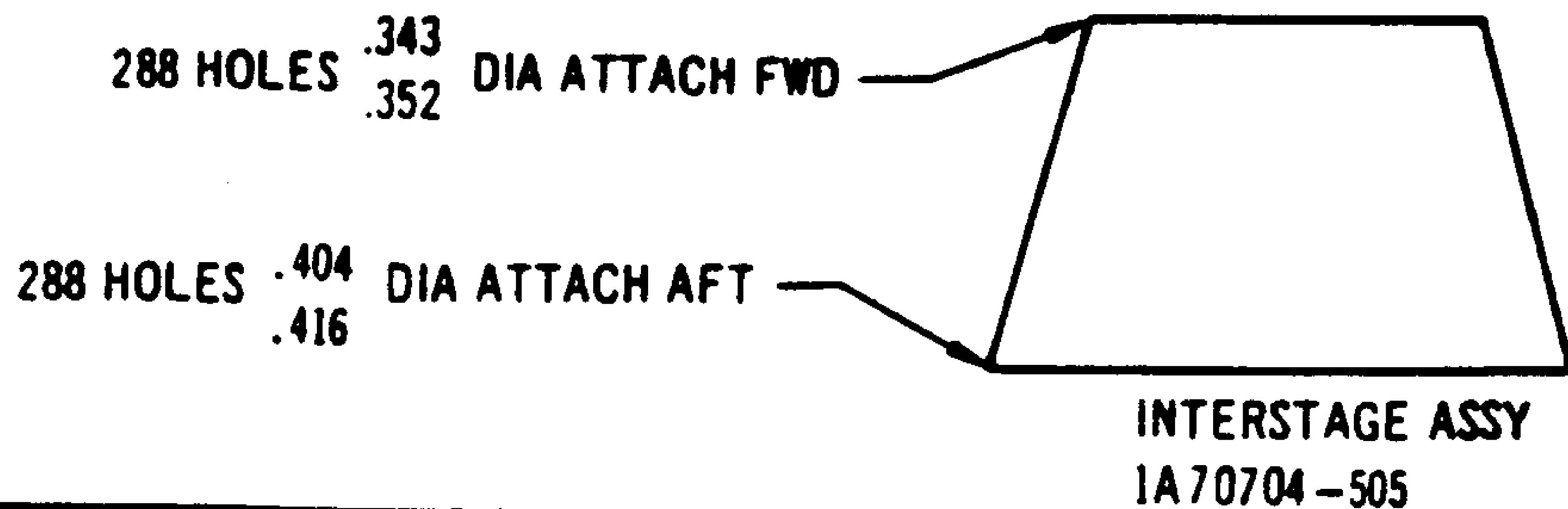
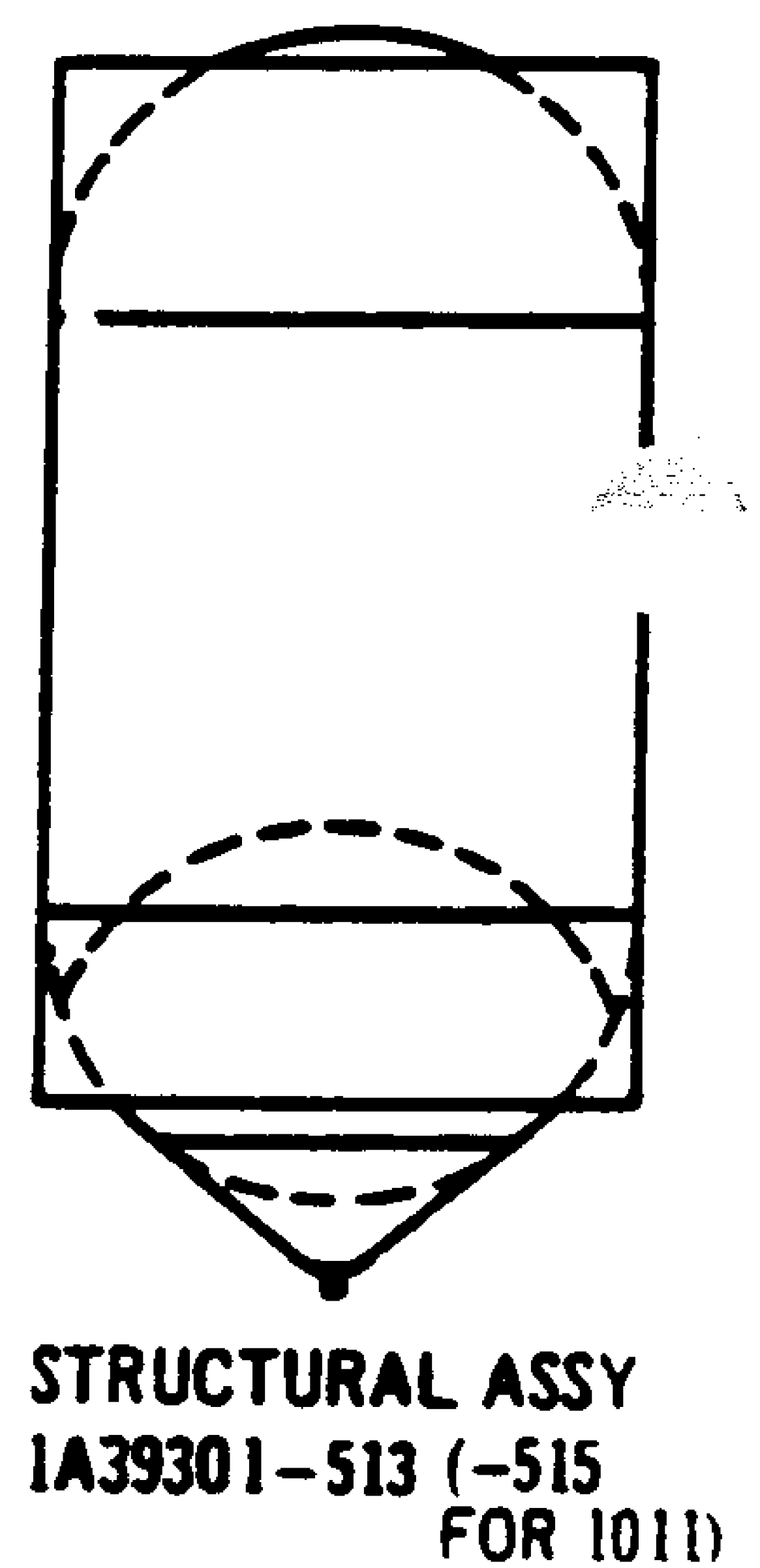
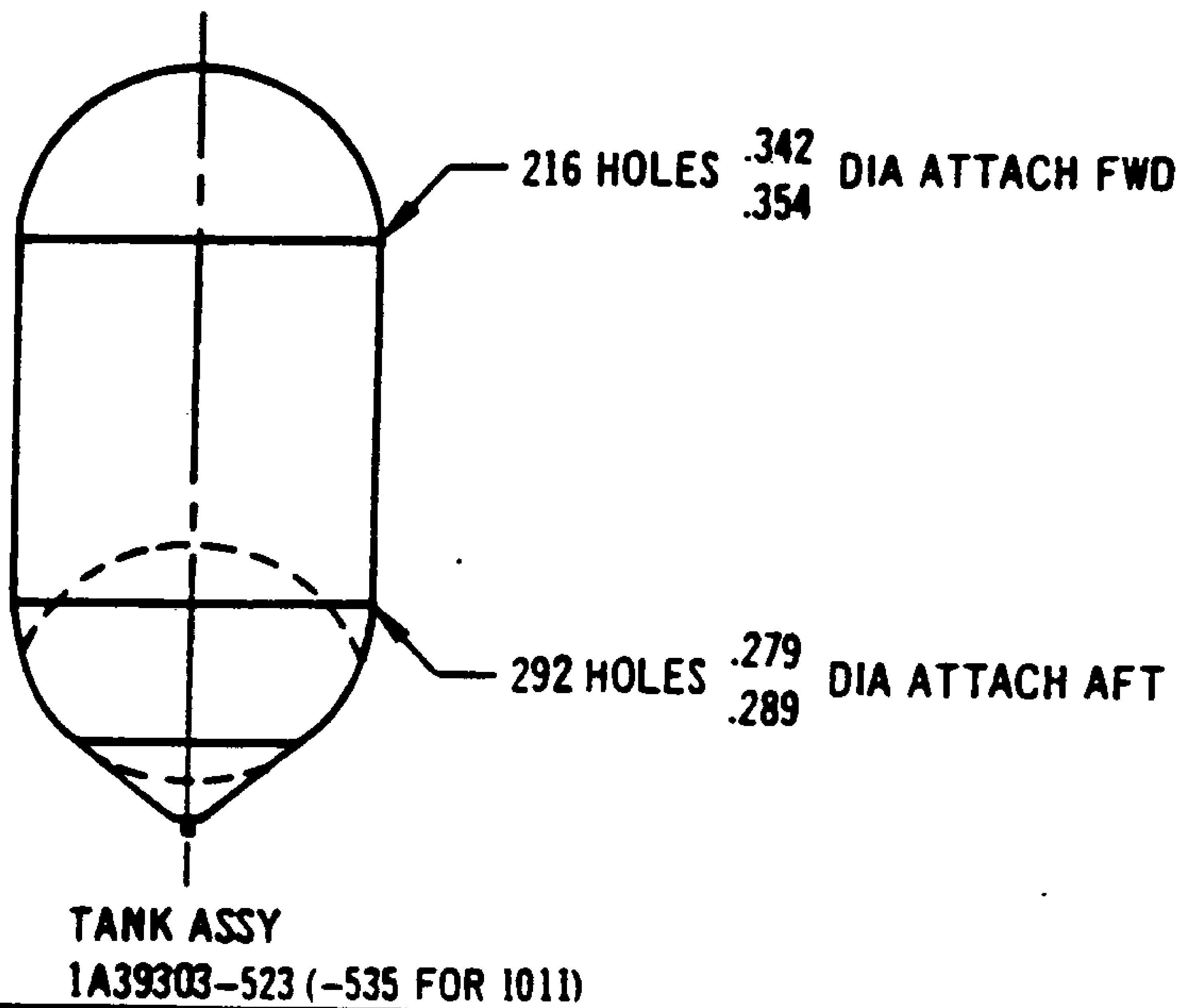
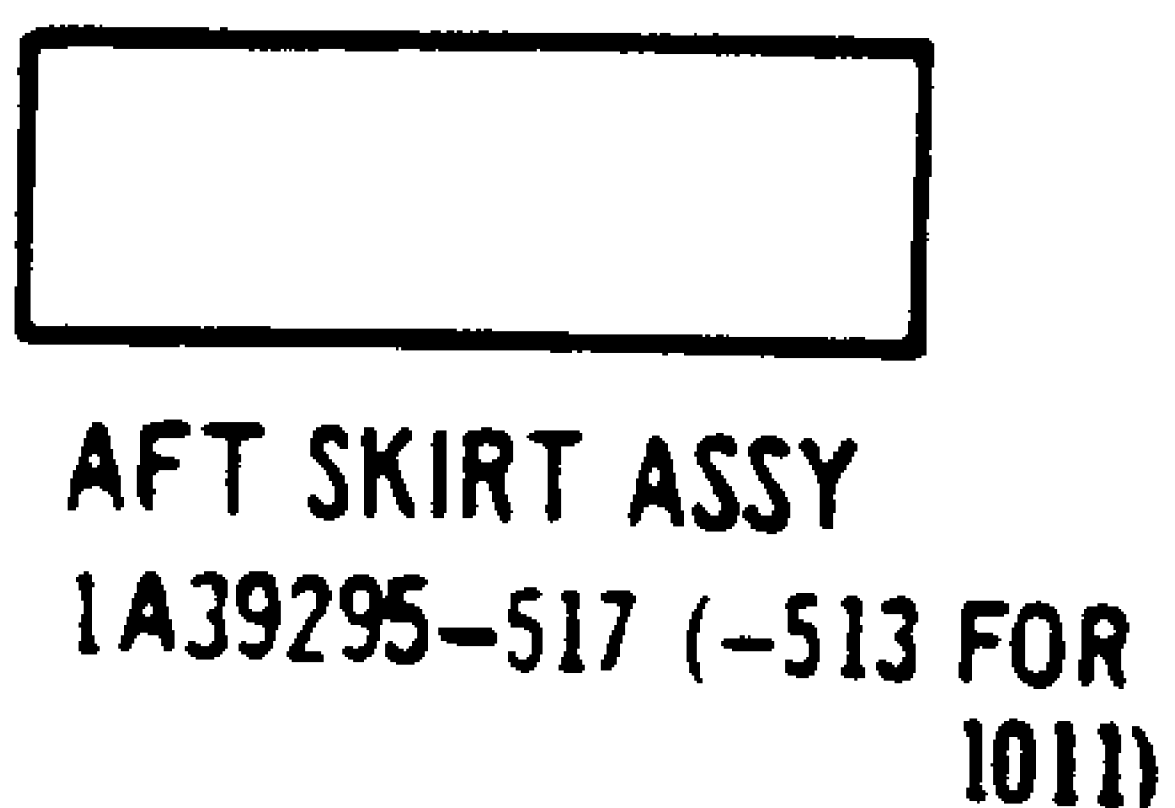
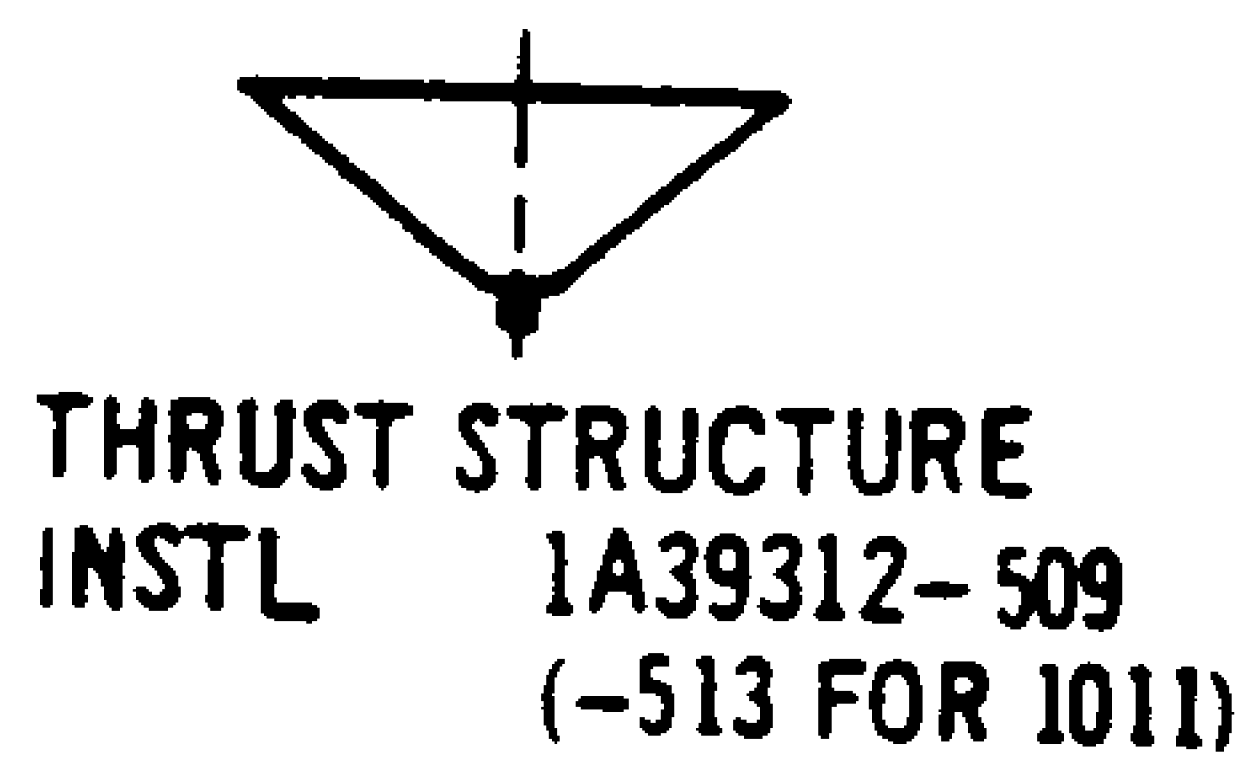
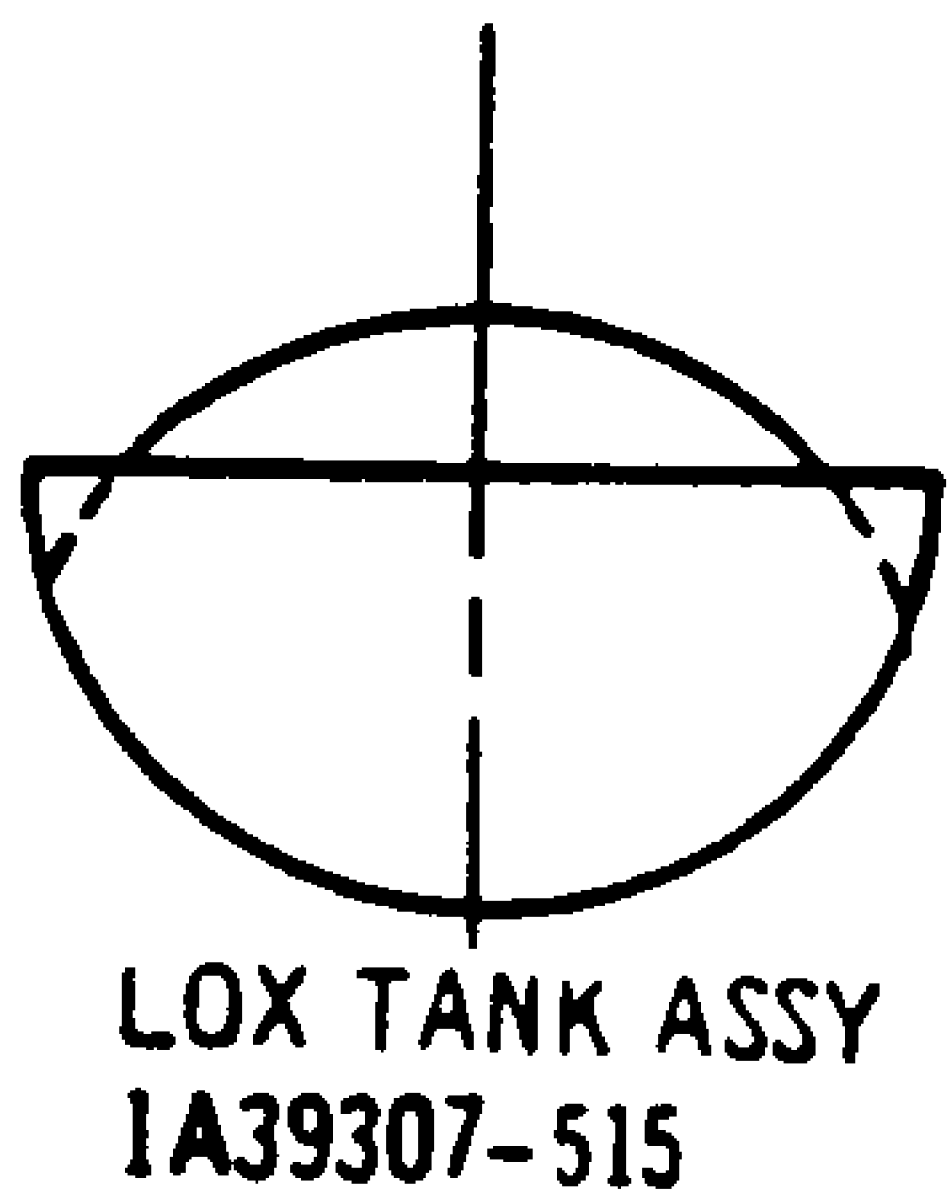
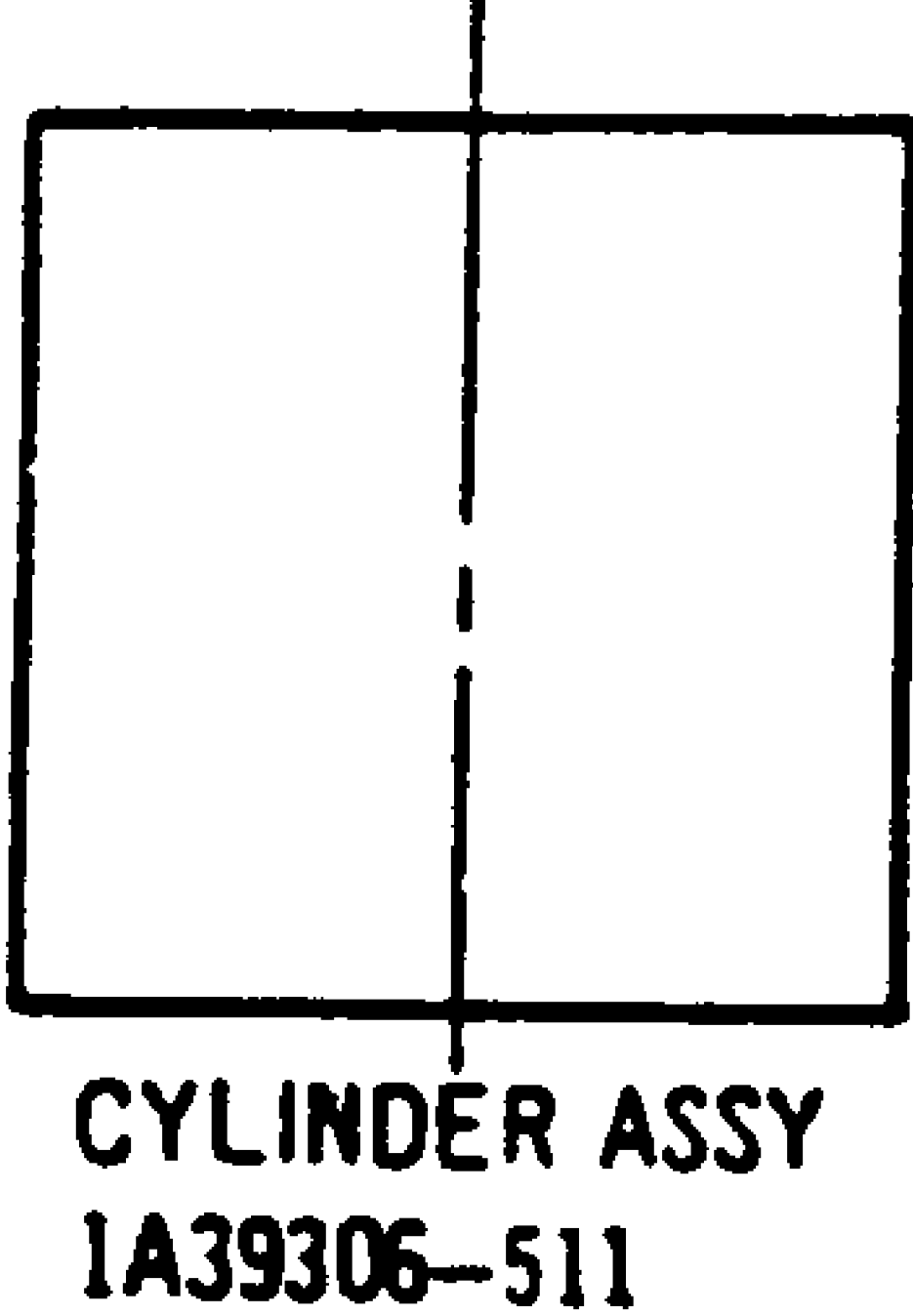
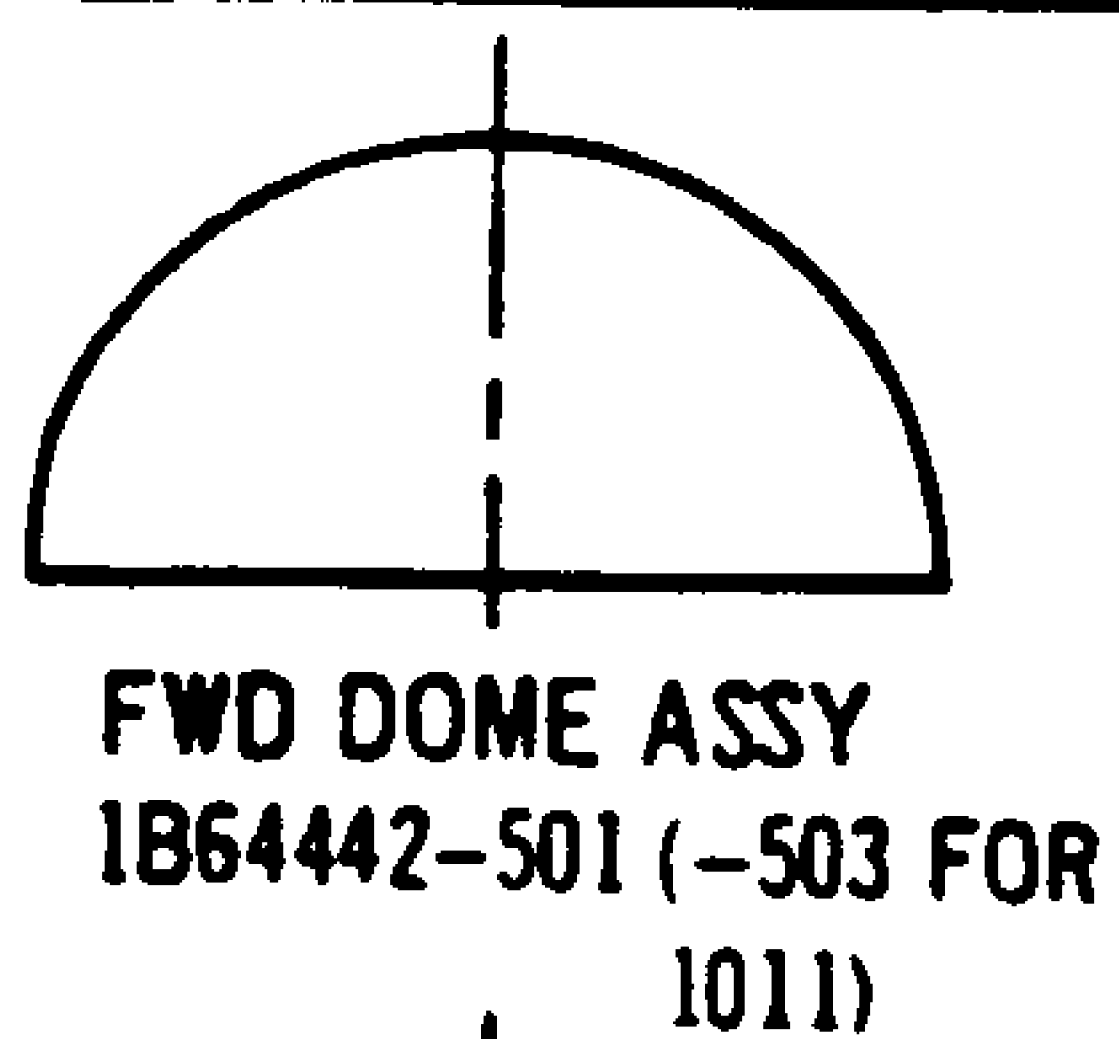
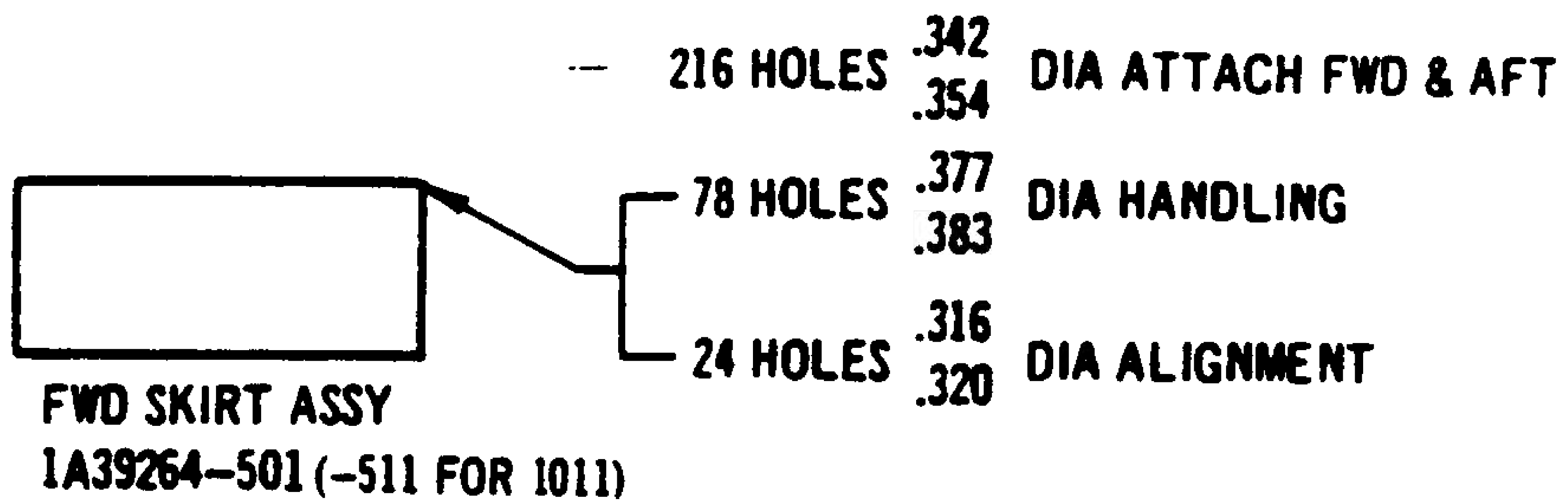
FLIGHT STAGE (1008)





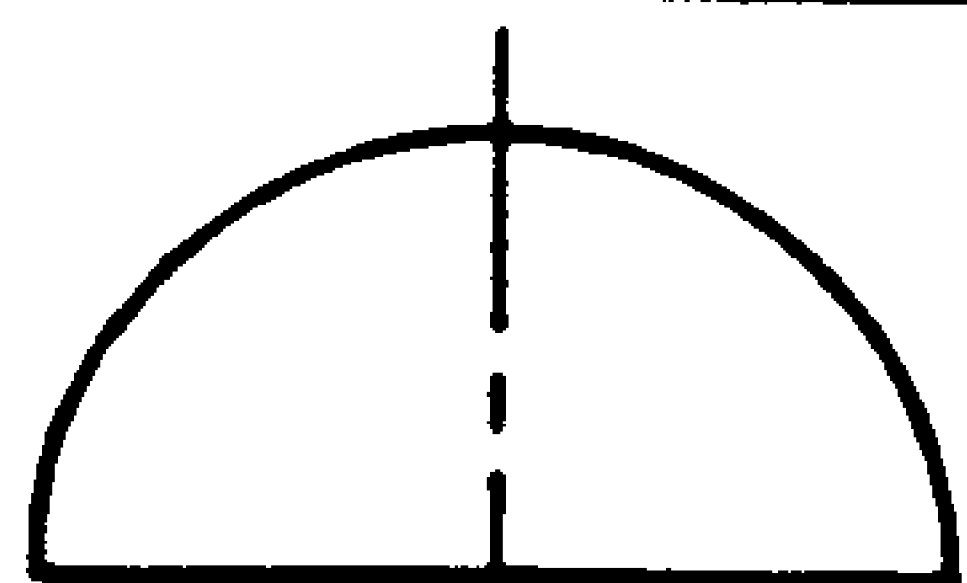
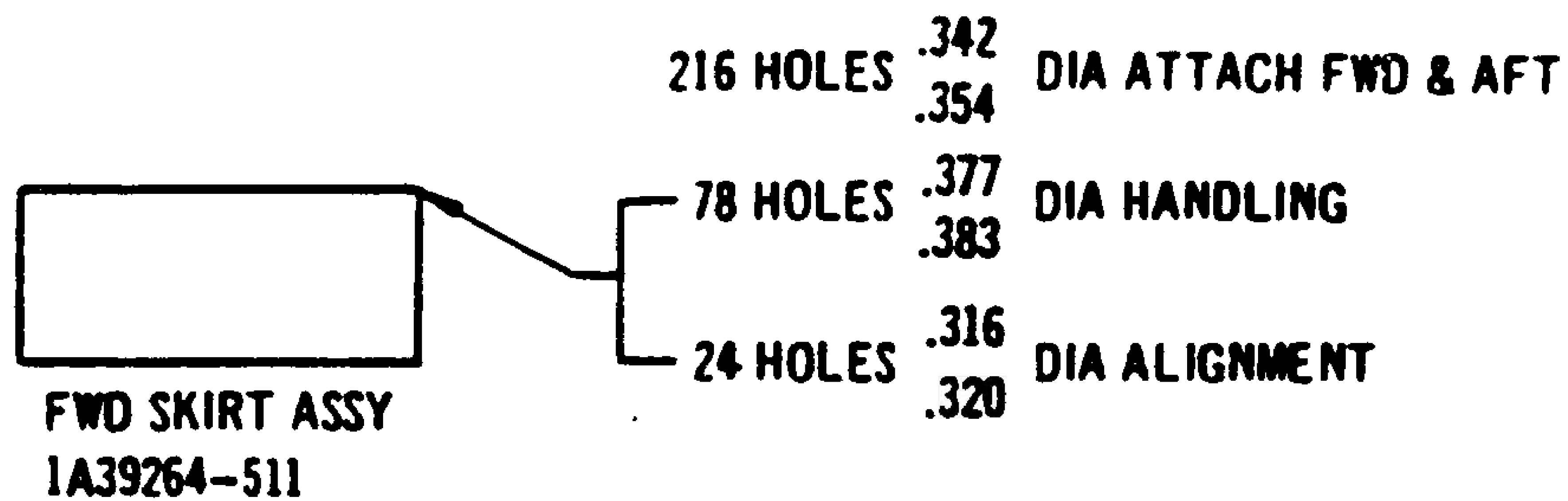
FLIGHT STAGE (1009)



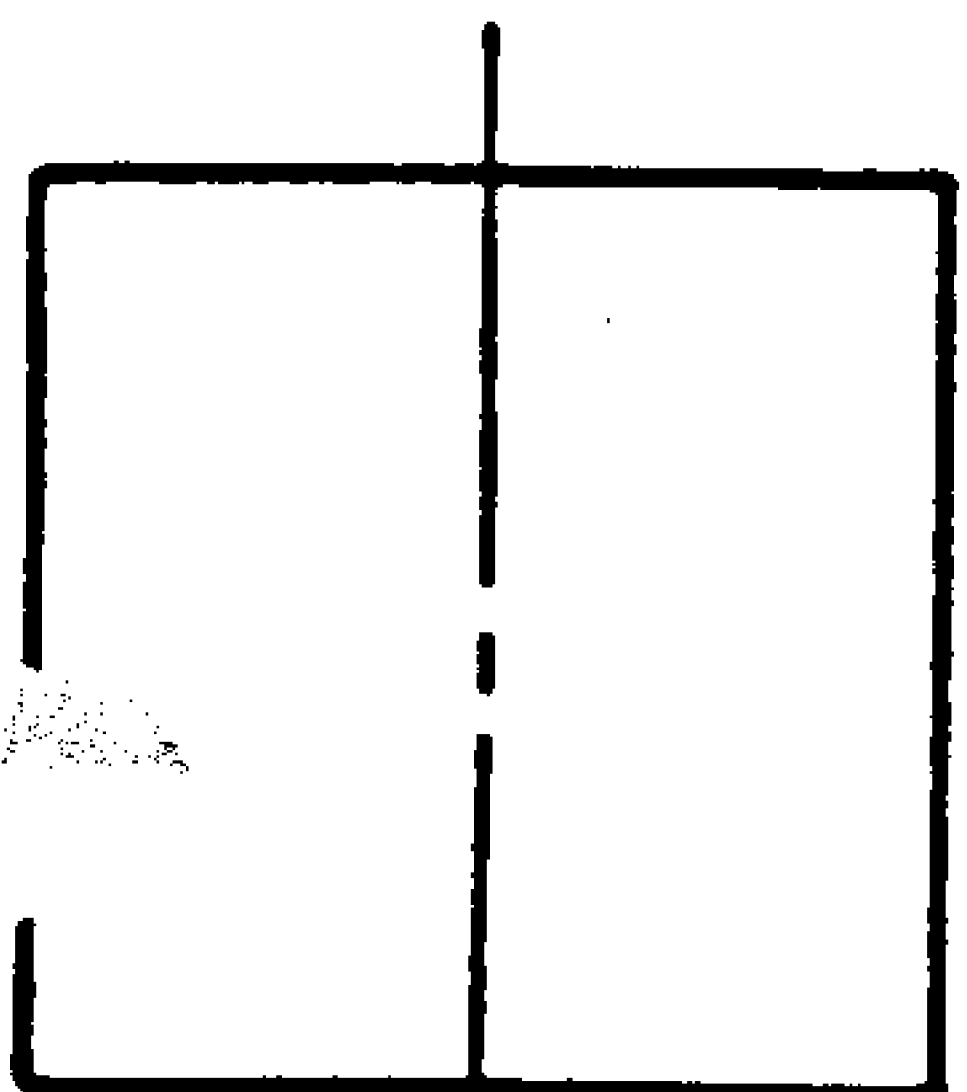


**FLIGHT STAGES (1010 & 1011)**

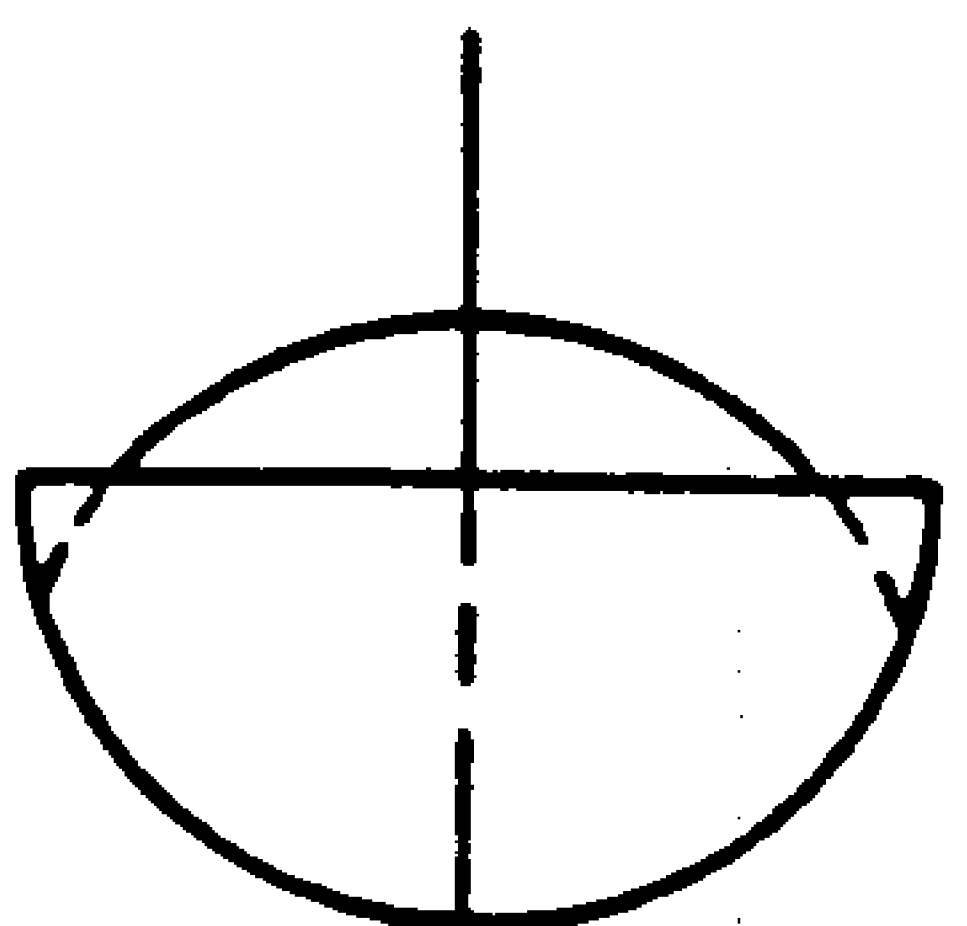




FWD DOME ASSY  
1B64442-503

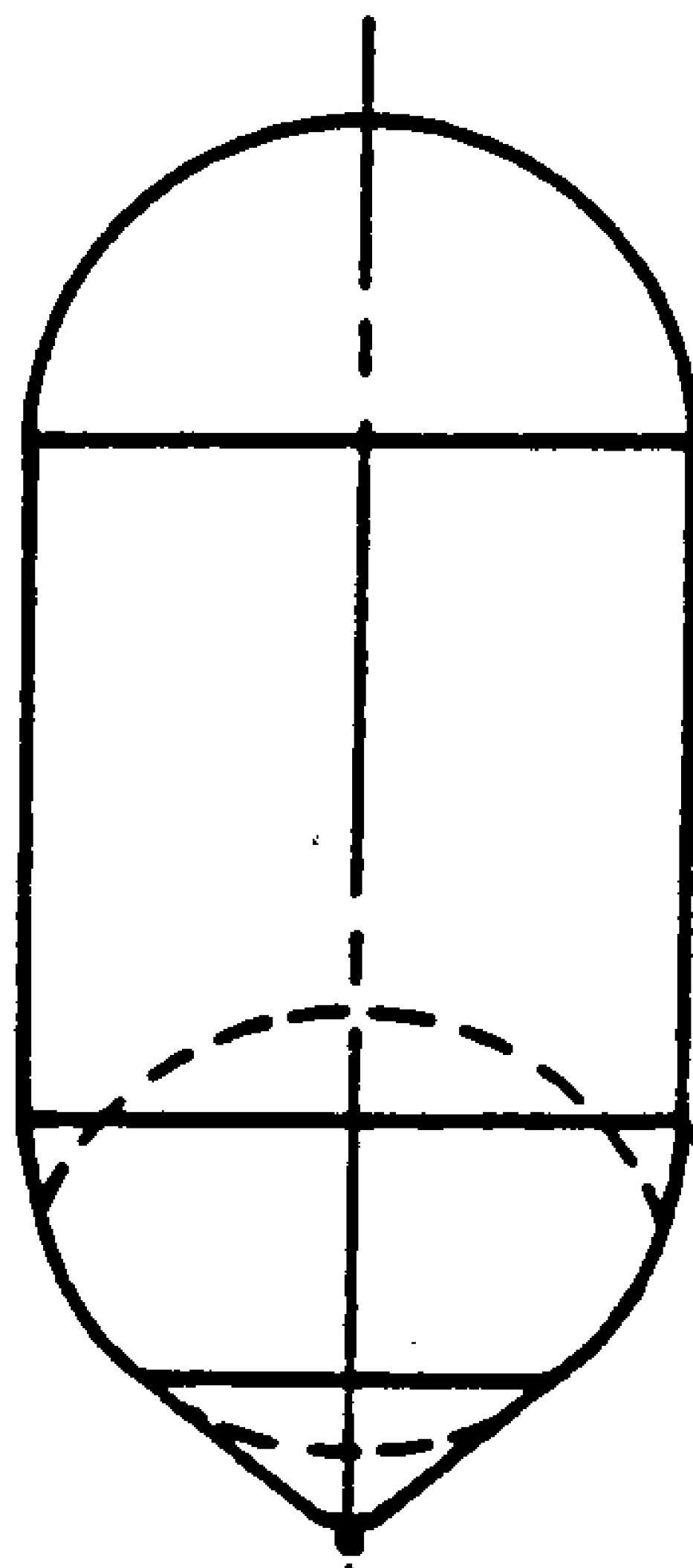


CYLINDER ASSY  
1A39306-511



LOX TANK ASSY  
1A39307-515 (507 & 508)  
-527 (509)

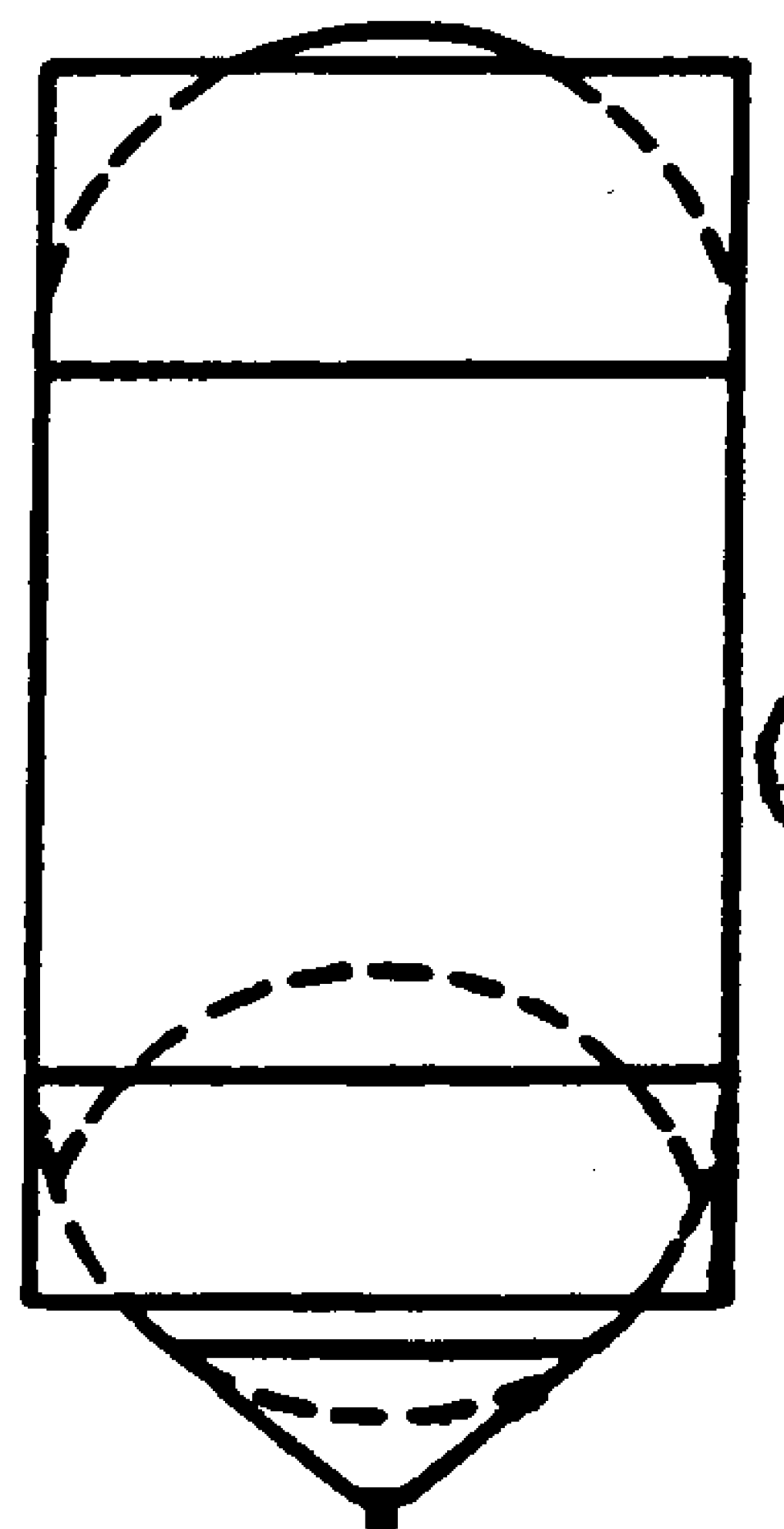
THRUST STRUCTURE  
INSTL 1A39312-513



TANK ASSY  
1A39303-535 (507 & 508), -549 (509)

216 HOLES .342 DIA ATTACH FWD  
.354

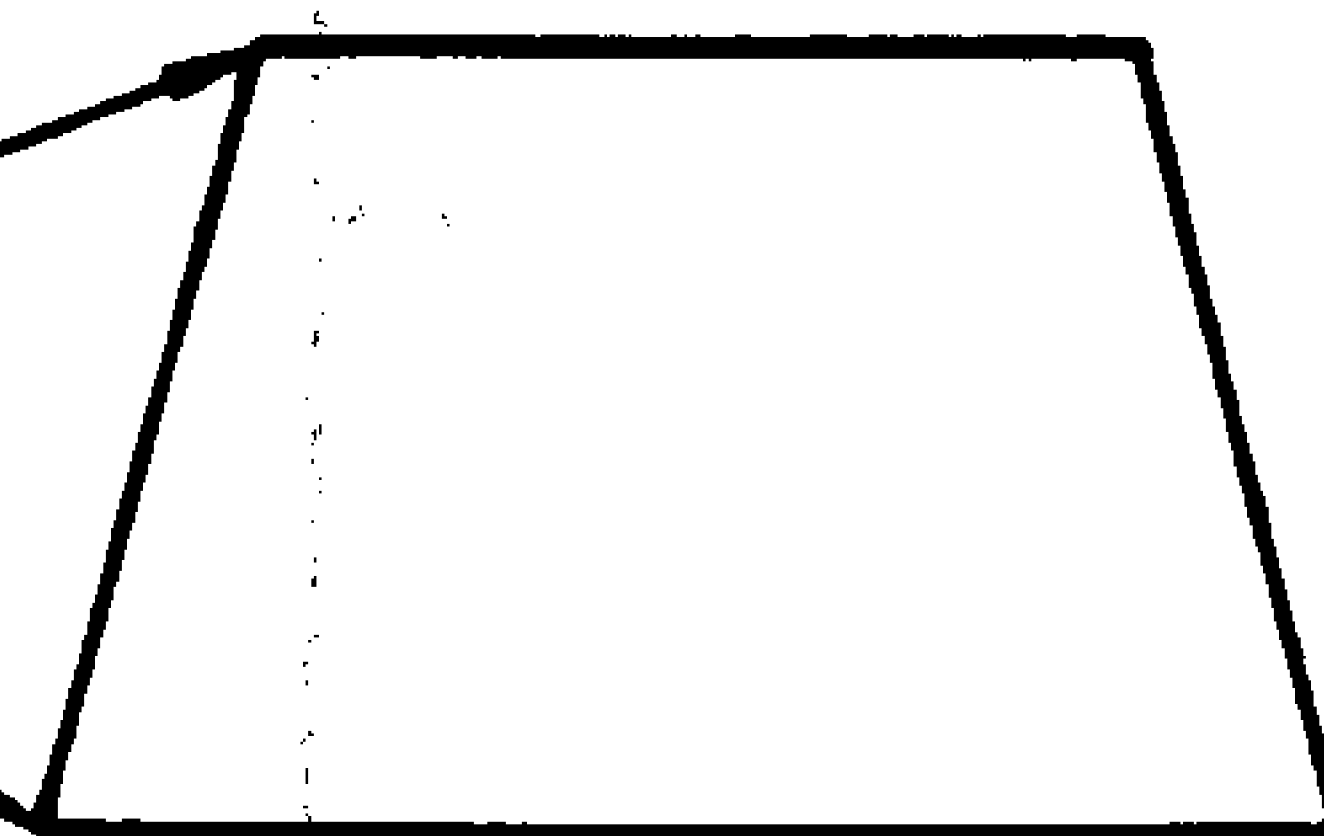
292 HOLES .279 DIA ATTACH AFT  
.289



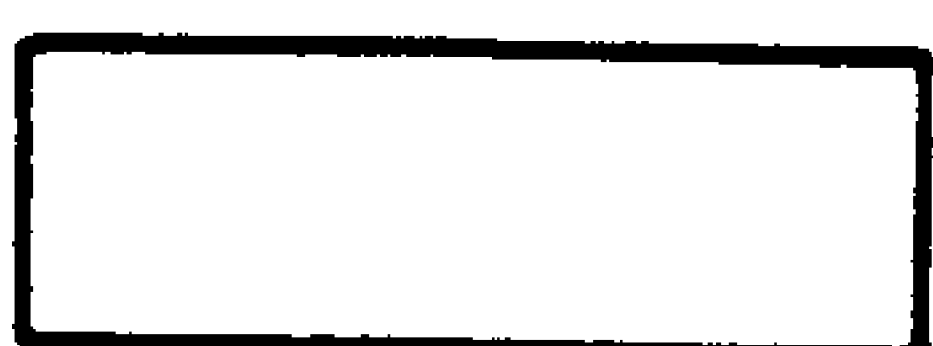
STRUCTURAL ASSY  
1A39301-515 (507 & 508),  
-523 (509)

288 HOLES .343 DIA ATTACH FWD  
.352

288 HOLES .404 DIA ATTACH AFT  
.416



INTERSTAGE ASSY  
1A70704-507 (507 & 508),  
-505 (509)



FT SKIRT ASSY  
1A39295-513



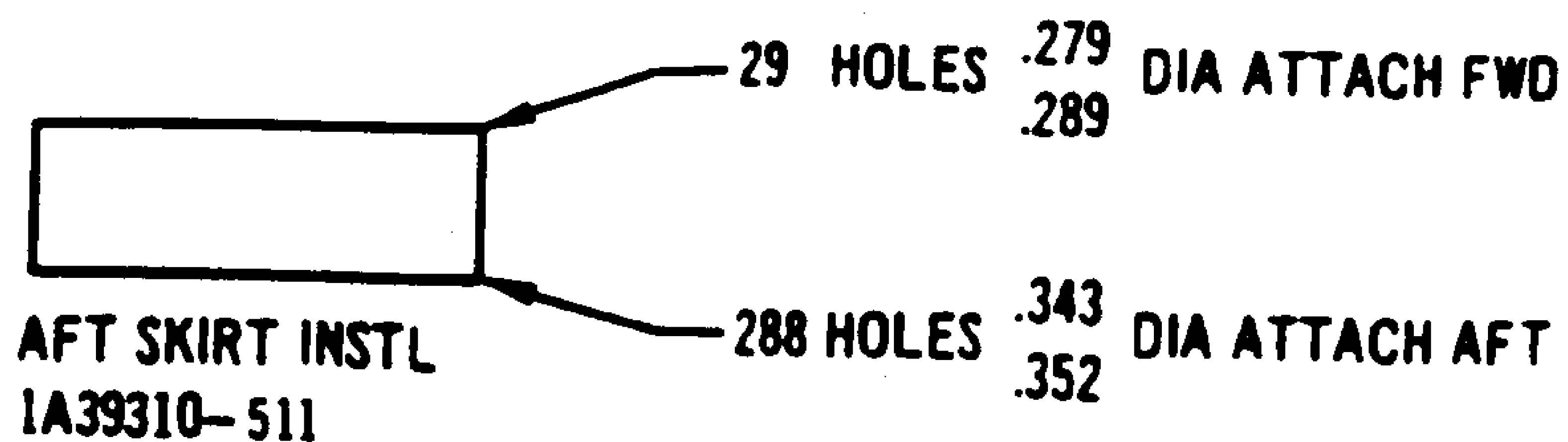
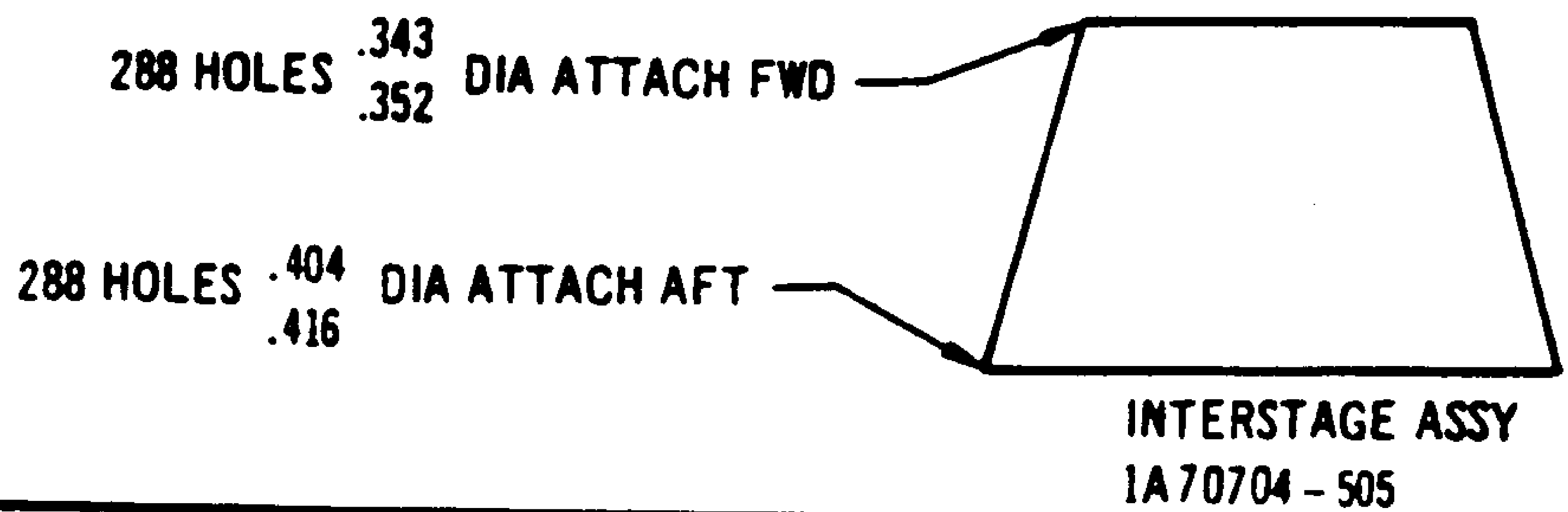
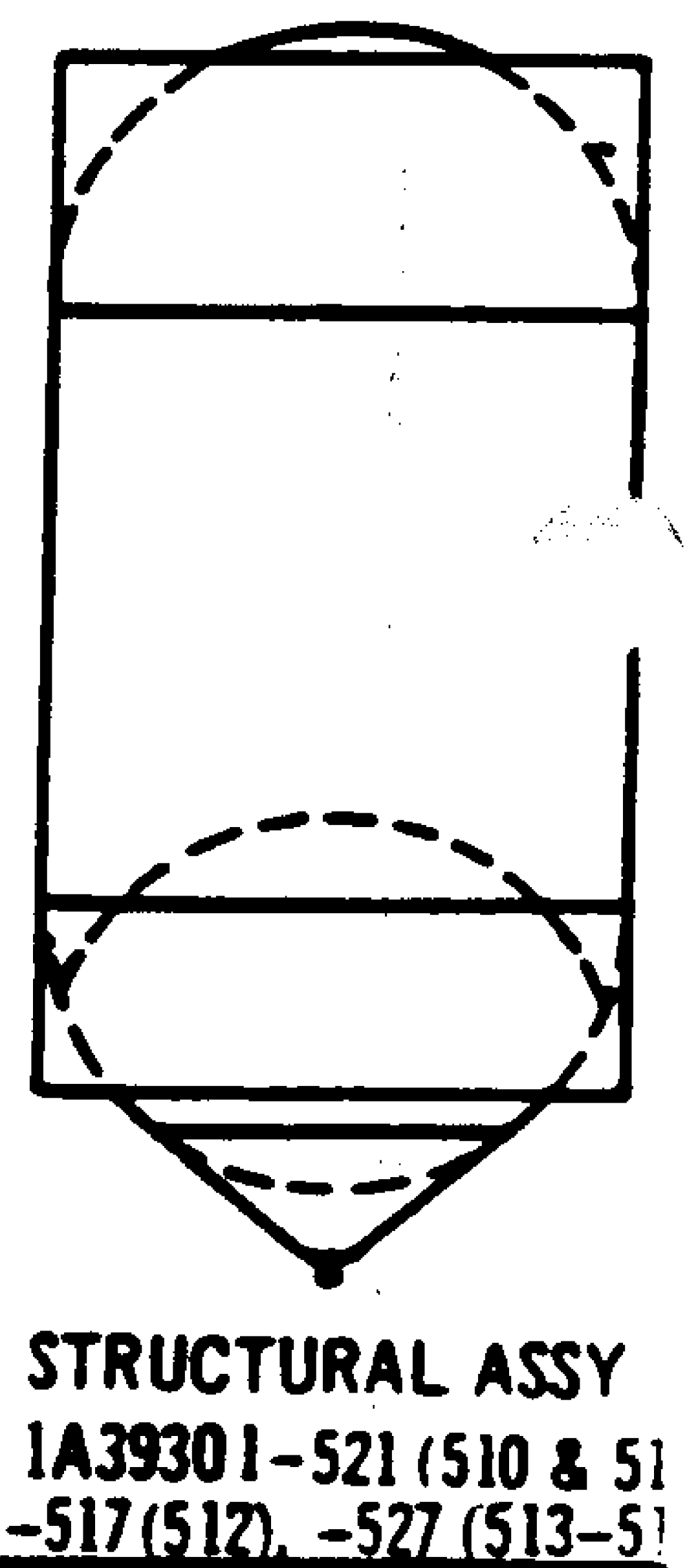
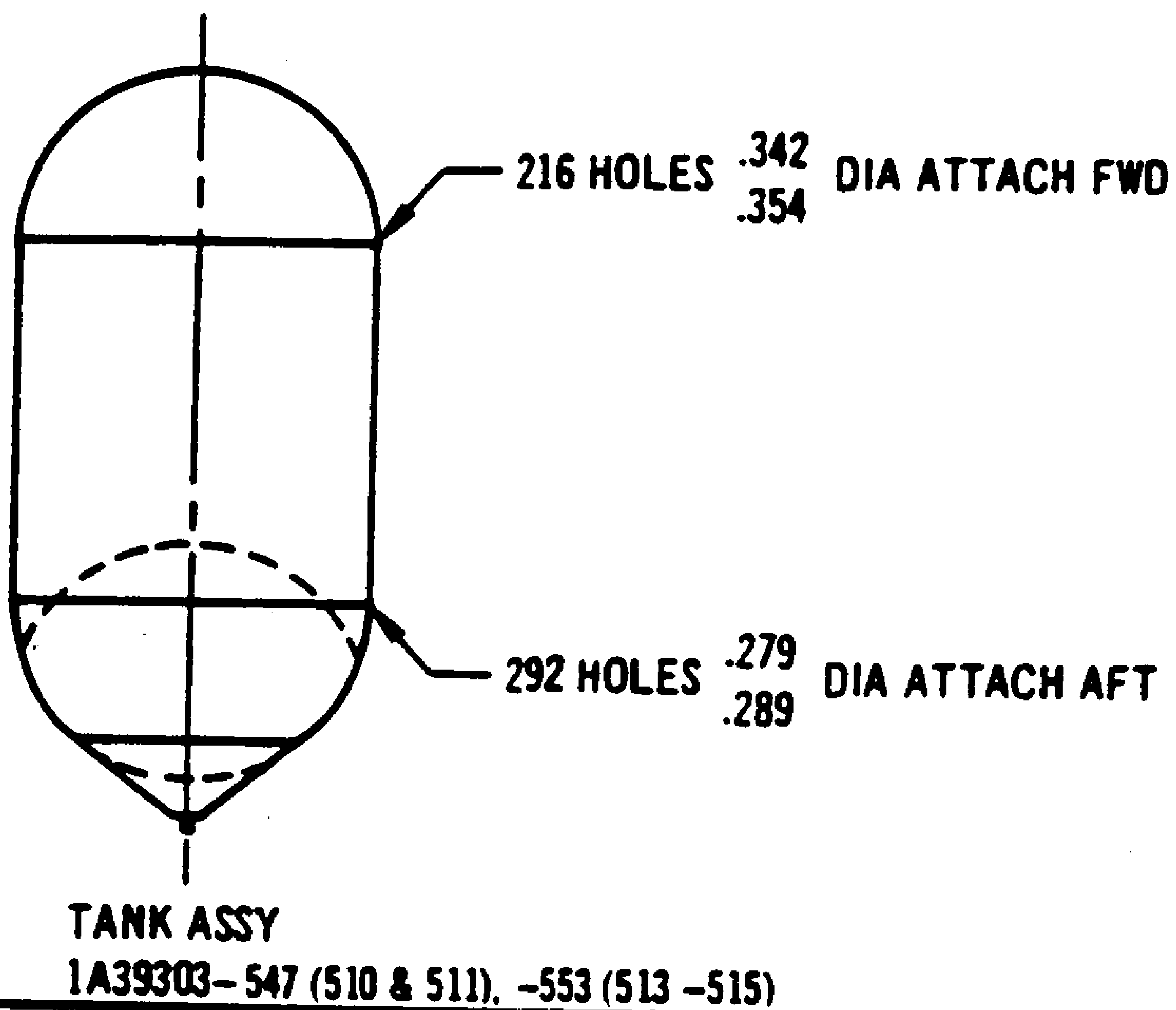
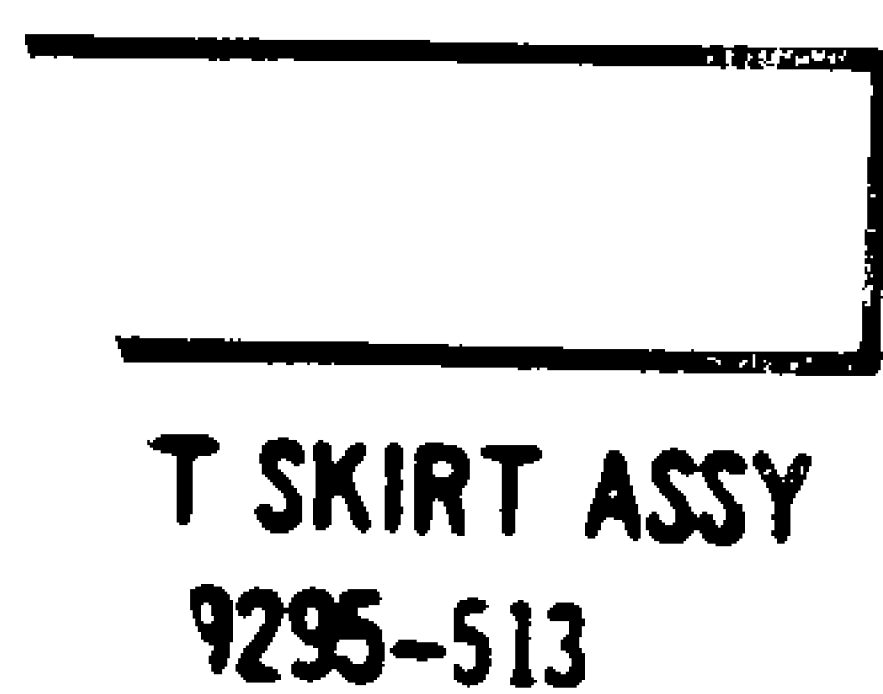
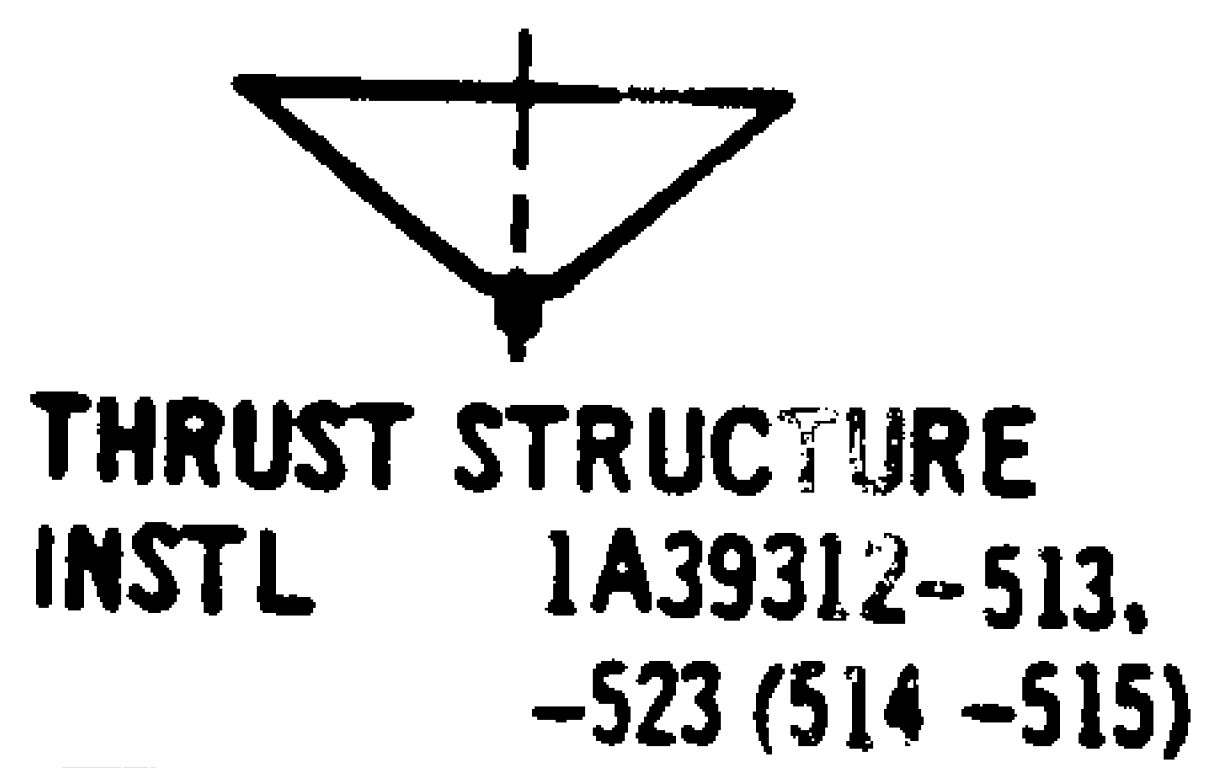
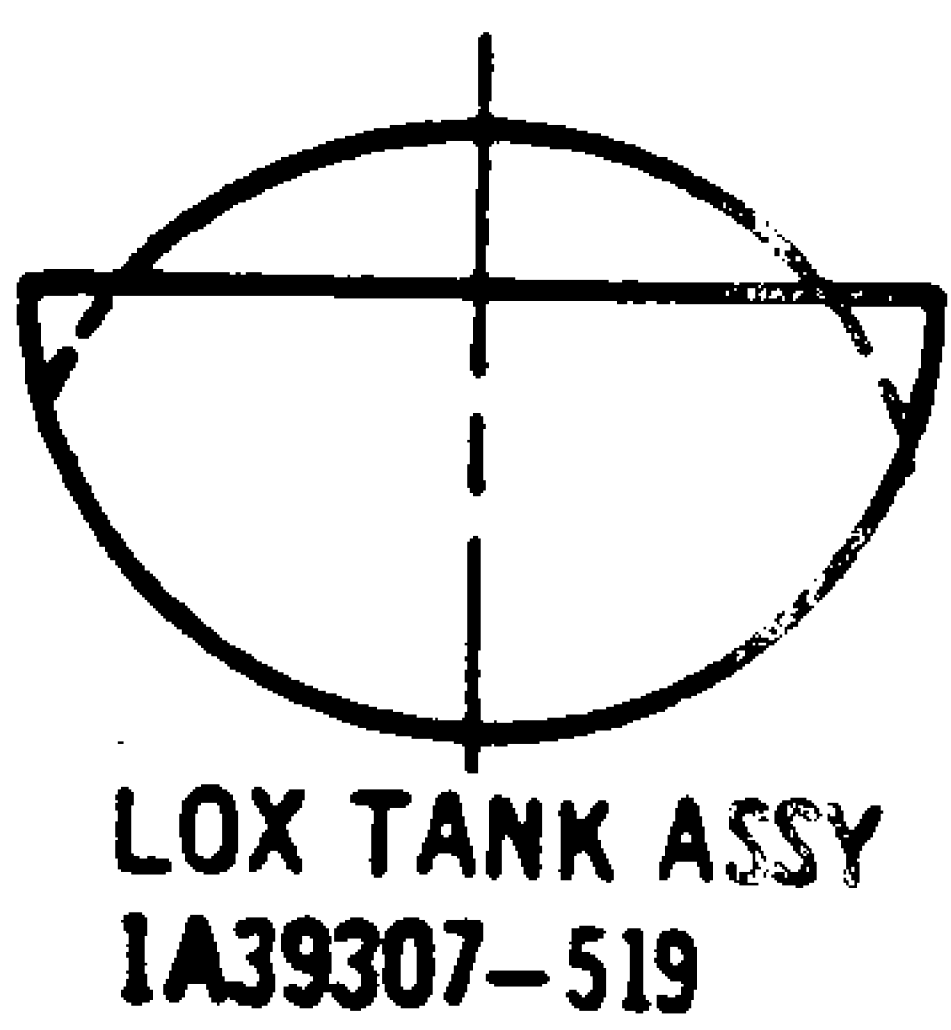
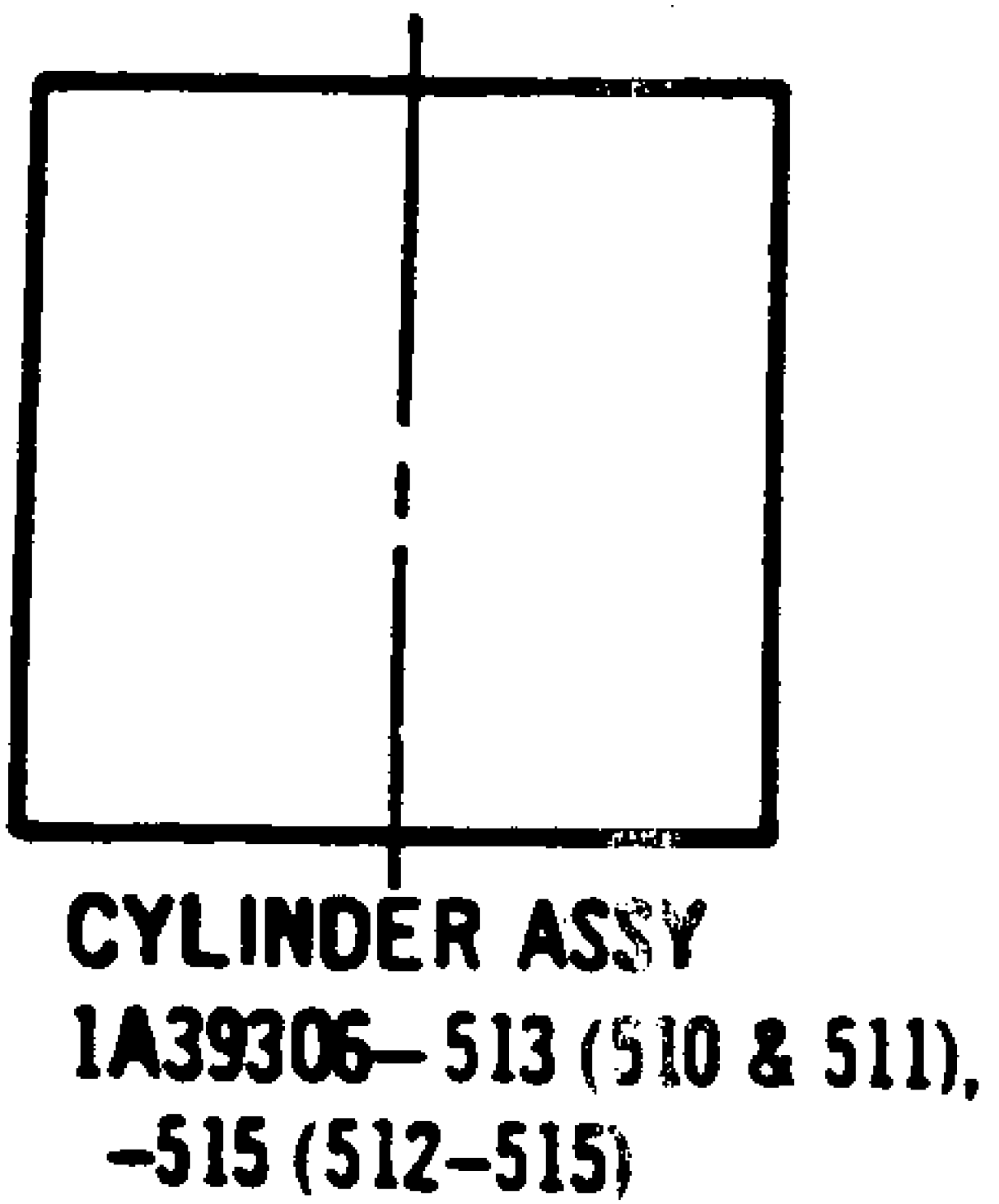
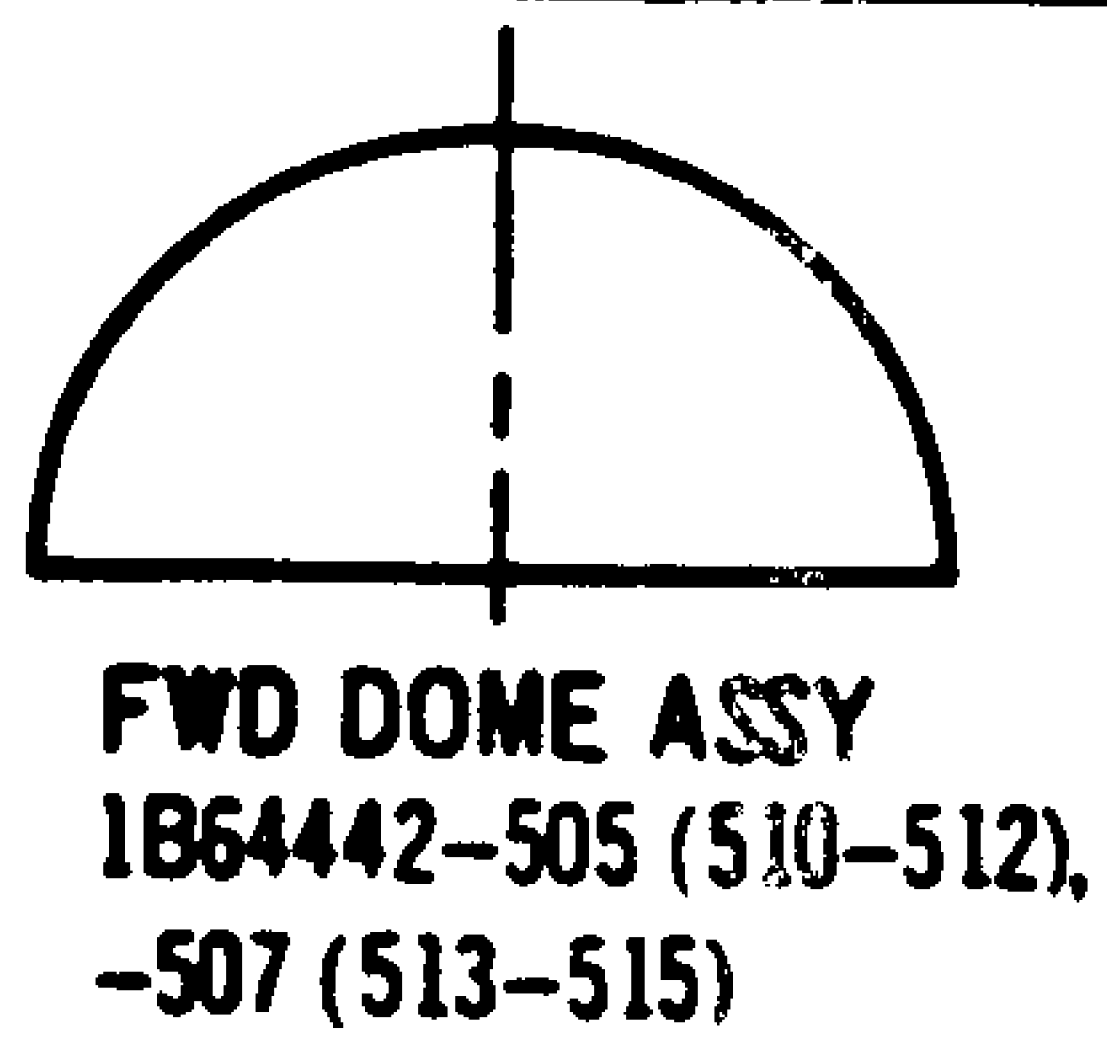
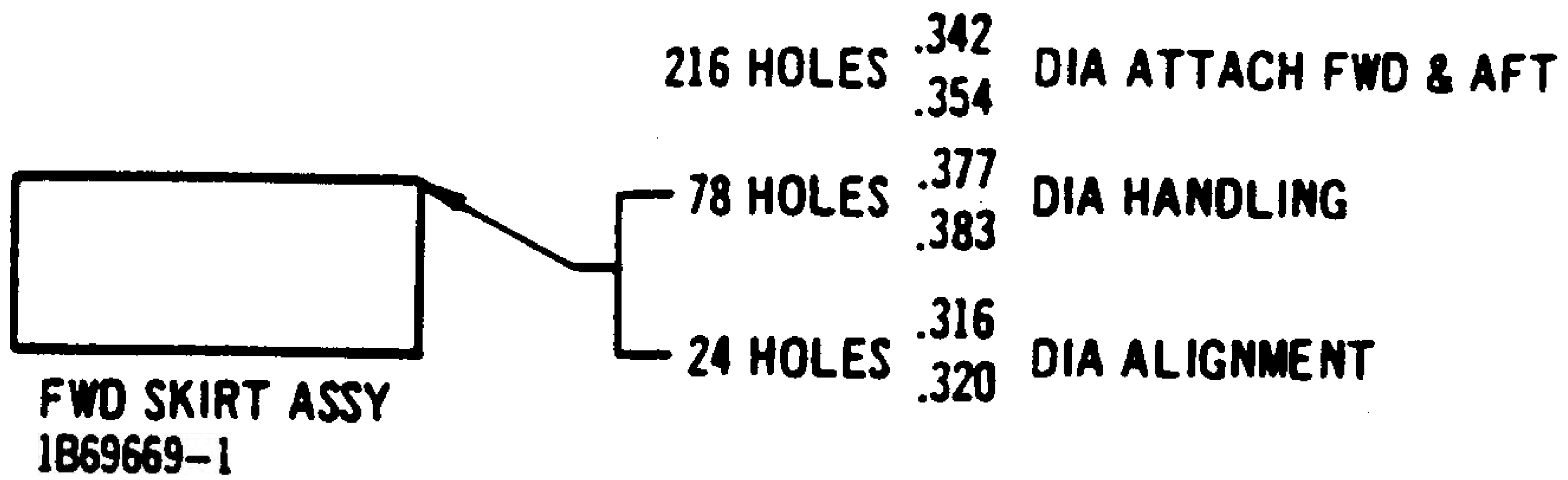
AFT SKIRT INSTL  
1A39310-511

292 HOLES .279 DIA ATTACH FWD  
.289

288 HOLES .343 DIA ATTACH AFT  
.352

FLIGHT STAGES (507 - 509)





FLIGHT STAGES (510 - 515)